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KEARNY, NEW JERSEY**



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## LIST OF ABBREVIATIONS AND ACRONYMS

ACO	Administrative Consent Order
BEHP	bis(2-ethylhexyl)phthalate
COPR	Chromium Ore Processing Residue
CPT	Cone Penetrometer Test
DNAPL	Dense Non Aqueous Phase Liquid
DOT	Department of Transportation
ERM	Environmental Resources Management, Inc.
FRI	Focused Remedial Investigation
ft	feet
ft-msl	feet above mean sea level
ft-bgs	feet below ground surface
Fugro	Fugro Geosciences, Inc.
GWQC	Ground Water Quality Criteria
HMDC	Hackensack Meadowlands Development Commission
HSA	Hollow Stem Auger
ID	Inner Diameter
IGWSCC	Impact to Groundwater Soil Cleanup Criteria
in	Inches
JCA	James C. Anderson and Associates
KEY	Key Environmental, Inc.
Koppers	Koppers Company, Inc.
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
MW	Monitoring Well
NAD83	North American Datum of 1983
NAPL	Non Aqueous Phase Liquid
NAVD88	North American Vertical Datum of 1988
NJDEP	New Jersey Department of Environmental Protection
NRDCSCC	Non-Residential Direct Contact Soil Cleanup Criteria
nm	nano-meters
OVM	Organic Vapor Monitor
PCBs	Polychlorinated biphenyls
PID	Photo-ionization Detector
ppb	parts per billion
ppm	parts per million

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PRAP	Proposed Remedial Action Plan
RASR	Remedial Action Selection Report
RAWP	Remedial Action Work Plan
RDCSCC	Residential Direct Contact Soil Cleanup Criteria
ROST <sup>TM</sup>	Rapid Optical Screening Tool
SCCC	Standard Chlorine Chemical Company
SNP	Standard Naphthalene Products
SRI	Supplemental Remedial Investigation
STL	Severn Trent Laboratories
SVOCs	Semi-volatile Organic Compounds
TAL	Target Analyte List
TCL	Target Compound List
VOCs	Volatile Organic Compounds
Weston	Roy F. Weston, Inc.
WTM	Wavelength Time Matrix

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*Supplemental Remedial Investigation Report  
Standard Chlorine Chemical Company  
Kearny, New Jersey*

## 1.0 INTRODUCTION

This report presents the results of the Supplemental Remedial Investigation (SRI) conducted at the Standard Chlorine Chemical Company, Inc. (SCCC) Site located in Kearny, New Jersey. The investigation of the SCCC Site is being performed pursuant to the Administrative Consent Order (ACO) executed on October 20, 1989 between SCCC and the New Jersey Department of Environmental Protection (NJDEP).

The objectives of the SRI were to complete characterization of soil and groundwater over the western two-thirds of the SCCC property and to further evaluate the nature and extent of potentially recoverable Dense Non-Aqueous Phase Liquid (DNAPL) at the Site. Specific items to be addressed during the SRI were identified in the NJDEP November 8, 1995 comments on the Remedial Investigation Report dated May 1993. These items included the following:

- Addressing septic tanks 4 and 5, including potentially contaminated surrounding soils, as source areas to be addressed in accordance with the NJDEP Technical Requirements for Site Remediation (N.J.A.C. 7:26E);
- Delineation of the extent of polychlorinated biphenyls (PCBs) in soils surrounding the transformer pad;
- Determination of the source and extent of dichlorobenzene and phenol detected in the groundwater sample collected from monitoring well MW-3L; and,
- Determination of the source and extent of free product in the area of monitoring well MW-15L.

In addition to these items, SRI activities included the sampling and abandonment of the inactive former plant production well.

As indicated in the NJDEP November 8, 1995 comment letter, these issues were rendered "dormant" while SCCC completed a Focused Remedial Investigation (FRI) and prepared a Proposed Remedial Action Plan (PRAP) for the eastern portion of the facility. The PRAP and FRI Report were submitted to the NJDEP in January 1997. In a letter dated June 3, 1997, NJDEP conditionally approved the proposed capping and containment remedy for the eastern portion of the Site, as presented in the PRAP, and conditionally accepted the FRI Report. However, the NJDEP did not accept SCCC's proposal for passive DNAPL collection. The NJDEP directed SCCC to address the comments on the PRAP in the Remedial Action Work Plan (RAWP).

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A meeting was held between SCCC and NJDEP on August 7, 1997 to discuss the investigation and remediation of the SCCC Site. At the meeting, the parties agreed to proceed with the remaining investigative activities stipulated in the NJDEP November 8, 1995 comment letter. On September 10, 1997, SCCC provided NJDEP with a letter plan for implementation of the SRI. Following two rounds of comments and responses, SCCC and NJDEP met on February 4, 1998 to reach a consensus on the outstanding investigation issues. By letter dated February 18, 1998, NJDEP indicated that the resolution of issues during the February 4, 1998 meeting would allow SCCC to proceed with implementation of the SRI.

## **1.1 REPORT ORGANIZATION**

Section 1.0 of this report includes this introduction, and an overview of site background information. Section 2.0 summarizes the SRI scope of work and the methodologies used to implement this SRI. Section 3.0 discusses the results of this SRI. Section 4.0 presents conclusions and recommendations.

Boring logs and monitoring well construction diagrams are attached as Appendix A. Cone Penetrometer Test (CPT) and Rapid Optical Screening Tool (ROST™) data are included as Appendix B. Appendix C contains survey information for the monitoring wells soil borings. CPT/ROST™ soundings and other select Site features. The data acquired during the DNAPL recovery evaluation performed during the SRI is included in Appendix D. One copy of the laboratory data packages has been submitted to the NJDEP under separate cover.

## **1.2 SITE BACKGROUND**

The following subsections present an overview of site background information. Much of this information was gathered from either the 1993 RI Report prepared by Roy F. Weston, Inc. (Weston) or, the 1997 FRI Report prepared by Environmental Resources Management, Inc. (ERM).

### **1.2.1 Site Description**

The SCCC Site is approximately 25 acres in area and is located at 1015 through 1035 Belleville Turnpike, Kearny New Jersey. The Site location is shown on Figure 1-1. The Site is bounded by the Hackensack River to the east, Belleville Turnpike to the west, property owned by Maxus Energy (formerly Diamond Shamrock Company, Inc.) to the north, and the former Koppers Company, Inc. (Koppers) Seaboard Site to the south. Railroad tracks were historically present at the southwestern corner of the Site along the property boundary. A north trending rail spur was historically located west of the lagoon area. The Site is comprised of several parcels. The general Site layout is shown on Figure 1-2.

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A detailed description of the Site operational history is provided in the RI Report prepared by Weston. In summary, operations conducted at the Site by various entities included a naphthalene refining process and manufacture of products from dichlorobenzene and trichlorobenzene. The naphthalene refining operation was conducted in the eastern two-thirds of the Site. The manufacture of dichlorobenzene and trichlorobenzene products occurred on the western one-third of the property.

Residual waste materials, comprised of sludges and oils, were placed, and are currently present, within a lagoon located in the eastern portion of the property. According to the Weston RI Report, the lagoon occupies an area of approximately 33,000 square feet and has an average depth of 6 feet. Thus, the lagoon contains approximately 7,300 cubic yards of material.

### **1.2.2 Property Use**

Currently no industrial operations are conducted at the Site. The Site is zoned by the Hackensack Meadowlands Development Commission (HMDC) as heavy industrial. Present Site activities are limited to use of the office building on the western portion of the Site. The Site and surrounding properties are currently used for non-residential purposes. There are no residential developments in the vicinity of the Site and it is highly probable that the future uses of the SCCC Site and surrounding properties will remain non-residential in accordance with HMDC zoning.

### **1.2.3 Topography and Surface Drainage**

The ground surface at the Site is relatively flat, primarily ranging in elevation from 3 to 8 feet above mean sea level (ft-msl). The highest surface elevation, approximately 10-ft msl exists in the southeast corner of the Site. The eastern and western portions of the Site generally slope to a central drainage swale. This swale directs water to the south and then to the east along the southern property boundary for discharge to the Hackensack River via the south outfall. In addition to on-Site drainage, this ditch receives some sheet flow run-off from off-Site commercial and industrial properties to the west and south of the Site. The south outfall is equipped with a tide gate to prevent backflow from the Hackensack River during high tide.

A 24-inch diameter underground concrete stormwater pipe is present along the northern property boundary of the Site. This pipeline receives run-off via drop inlets from the Maxus property to the north of the SCCC property, as well as drainage from off-Site commercial, and industrial properties to the west. The stormwater pipe discharges to Hackensack River through an outfall which is located north of the Site. The outfall is equipped with a tide gate to prevent backflow from the river during high tide.

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The Hackensack River is adjacent to the entire eastern property boundary. The Hackensack River is tidally influenced and discharges to Newark Bay to the south. The overall direction of flow in the Hackensack River adjacent to the Site is from north to south. The Hackensack River in the vicinity of the Site receives some sheet flow run-off from the SCCC property, stormwater discharge from the southern drainage ditch, run-off and related discharges from properties to the north of SCCC via the north stormwater pipe, and surface water from downstream when the direction of flow reverses during high tide.

#### **1.2.4 Site Geology**

The Site geology consists of coastal plain sediments overlaying Triassic-age bedrock. Prior to industrial development, this area consisted of marshlands that bordered the Hackensack River. Fill materials were placed in the coastal marshlands of this region to create property for industrial development. These fill materials generally consisted of chromium ore processing residue (COPR) and silty sand. According to the Weston RI report, COPR was placed as fill on approximately 85% of the SCCC Site to depths ranging between 2 and 10 feet below the present grade. The original marsh surface, now located beneath the fill materials, consists of silt, humus and peat. This layer is regionally referred to as the Meadow Mat and is typically 2 to 5 feet thick at the SCCC Site. The upper surface of the Meadow Mat is undulating rather than planar.

A sand layer is present beneath the Meadow Mat that is generally less than 10 feet thick. A varved clay unit is present beneath the sand layer. This unit is continuous beneath the Site. The thickness of this unit is estimated at greater than 40 feet based on subsurface data acquired at the adjacent Koppers Site. A glacial till is present beneath the varved silt and clay layer. Based on information acquired from the Koppers Site, bedrock in the area is composed of red shale and sandstone of the Triassic-age Brunswick Formation, and ranges in depth from 60 to 100 feet below ground surface.

#### **1.2.5 Site Hydrogeology**

The water table at the Site occurs in the fill material placed above the Meadow Mat. The Meadow Mat acts as a basal semi-confining unit that limits, but does not completely eliminate, the hydraulic connection between the shallow fill materials and the deeper sand layer. Data acquired at nested well locations indicate a downward vertical gradient exists between the fill unit and the underlying sand layer. Groundwater in the fill unit exists under unconfined conditions. Previous studies have indicated that the fill unit is not tidally influenced.

A potentiometric mound exists in the fill unit in the vicinity of the lagoon. Groundwater flows radially away from this potentiometric high in the lagoon area. Beyond the influence of this mound.

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groundwater flow in the fill unit is primarily to the south, approximately parallel to the direction of flow in the Hackensack River.

Groundwater in the sand unit beneath the Meadow Mat exists under semi-confined conditions. The underlying varved clay acts as an effective barrier to the downward migration of groundwater from this unit. Groundwater flow in the sand unit is primarily to the south-southeast. A slight potentiometric mound has been observed in the area to the northwest of the lagoon. Groundwater flow toward the east is observed in the northeast portion of the Site in the immediate vicinity of this mound. Horizontal hydraulic gradients in the sand unit are relatively flat ranging from 0.003 to 0.008. The average horizontal hydraulic conductivity in the sand unit, as determined through slug tests, is 5.34 ft/day ( $1.9 \times 10^{-3}$  cm/sec).

Groundwater within the sand unit is tidally influenced to some extent. Fluctuations in potentiometric surface elevations that are correlated to tides in the Hackensack River have been observed in monitoring wells located immediately adjacent to the river. Because of its limited extent, the tidal influence has not been observed to create significant changes in groundwater flow directions between high and low tide.



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## **2.0 SUPPLEMENTAL REMEDIAL INVESTIGATION SCOPE OF WORK AND METHODOLOGIES**

This section summarizes the scope of work completed during the SRI and the methodologies employed during implementation of the field activities. The following presents an overview of the activities performed:

- Collection of surface soil samples and a concrete chip sample at the location of the former transformer for analysis for PCBs;
- Sampling and abandonment of a former on-Site production well;
- Analysis of select soil samples from two soil borings completed in the vicinity of monitoring well MW-3L and the borings drilled for installation of monitoring wells MW-16L and MW-17L;
- Installation of two new groundwater monitoring wells in the vicinity of existing monitoring well MW-3L and the collection and analysis of groundwater samples from these new wells;
- Investigation of the extent of free-phase DNAPL in the shallow fill and underlying sand groundwater-bearing units; and,
- Evaluation of the feasibility of DNAPL recovery.

The collection of surface soil and concrete chip samples for PCB analysis and the sampling of the former production well were performed during an October 1998 mobilization. The remaining scope of work was completed during January 1999.

### **2.1 TRANSFORMER AREA SURFACE SOIL/CONCRETE CHIP SAMPLING**

The purpose of this task was to further delineate the extent of PCBs detected in sediment in the transformer area during the 1993 RI. One concrete chip sample and three surface soil samples were collected from the former transformer pad area on October 9, 1998. PCB sample locations are shown on Figure 2-1.

The concrete chip sample was obtained from a 1-ft square area, which was located in front of the drain spigot of the existing transformer. All surface debris was removed from the area, and fine

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materials were washed away from the area by rinsing with laboratory-supplied de-ionized water. An electric jack-hammer was used to create a starter hole in the concrete to a depth of approximately 1/2 inch. Subsequently, a masonry chisel and hammer were used to loosen concrete chips across the selected 1-ft square area to a depth of approximately 1/4-inch. The chips were collected and placed in the laboratory-supplied containers.

No unpaved surface exists in the vicinity of the transformer. The ground surface in this area is covered by asphalt. The soil samples were obtained from immediately beneath the asphalt in the area immediately to the north of the transformer pad. The jack-hammer was used to cut an approximately 1.5-ft square access hole through the asphalt pavement at three locations surrounding the concrete transformer pad. The pavement materials were removed from the hole, and the underlying soil materials were sampled. The soil samples were homogenized in a stainless-steel mixing bowl then placed in the sample container. Following sample collection, asphalt patch material was used to repair the pavement surface at each sampling location.

The concrete chip sampling equipment (masonry chisel) and shallow/surface soil sampling equipment (stainless-steel mixing bowl and scoop) were decontaminated after each use. Decontamination procedures included the following:

- Wash with tap-water and Alconox;
- Rinse with tap water;
- Rinse with pesticide-grade acetone; and,
- A final triple rinse of de-ionized water.

A field rinsate blank was collected from the decontaminated equipment following soil or concrete chip sampling activities. The field rinsate blank was collected by pouring laboratory supplied de-ionized water over the decontaminated chisel and scoop and into the stainless-steel mixing bowl. The rinsate was then poured from the bowl into the appropriate laboratory sample containers.

The concrete chip and the soil samples were analyzed for the presence of PCBs by EPA SW846 Methods 8081 and 8082 by NJDEP-certified laboratories. Severn Trent Laboratories (STL) performed the Method 8081 analyses. The Method 8082 analyses were performed by Philip Analytical Services.

## 2.2 PRODUCTION WELL SAMPLING AND ABANDONMENT

Sampling and abandonment were conducted in accordance with the December 30, 1996 Work Plan, as modified by the June 17, 1997 NJDEP letter. Prior to abandonment, groundwater samples were

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collected from the 10-inch diameter, 368 foot deep production well on October 8, 1998 to provide data to support the selection of an appropriate method for management of any groundwater displaced during the grouting operation. In accordance with the NJDEP June 17, 1997 letter, the groundwater samples were collected from three discrete intervals representing depths of ten feet below the bottom of the surface casing (88 ft-bgs), the middle of the water column (228 ft-bgs), and the bottom of the well (360ft-bgs).

The three groundwater samples were collected using a Teflon® point source bailer attached to Teflon® coated stainless steel cable. Samples were transferred directly from the bailer to analytical laboratory prepared sample containers. The sample containers were immediately placed in an insulated cooler containing ice.

The bailer and cable were decontaminated between samples using potable water and Alconox wash: potable water rinse; pesticide grade acetone rinse; de-ionized water rinse; nitric acid rinse; and final triple rinse of de-ionized water. A rinsate blank was collected to examine the effectiveness of this decontamination procedure. A trip blank was prepared by the analytical laboratory and sent with the samples to examine for the possibility of sample contamination during shipping and storage.

The production well groundwater samples were analyzed for the presence of Target Compound List (TCL) volatile organic compounds (VOC), TCL semi-volatile organic compounds (SVOC) and Target Analyte List (TAL) metals. The VOC and SVOC analyses were performed using EPA Methods 624 and 625, respectively. The metals were analyzed using EPA 200 series methods. The production well groundwater samples were analyzed by STL.

The results of the groundwater analyses were provided to NJDEP on November 13, 1998 and are summarized in Tables 2-1A, 2-1B, and 2-1C. Based on the results of these analyses, NJDEP recommended that any groundwater produced during closure of the production well be discharged to the lagoon in the eastern portion of the Site. The NJDEP issued a New Jersey Pollutant Discharge Elimination System Permit-by-Rule authorizing the discharge of the water to the lagoon area on December 10, 1999.

Closure of the former production well was completed in January 1999 by James C. Anderson and Associates (JCA) of Moorestown, New Jersey. JCA is a New Jersey licensed well driller that is certified by the NJDEP to seal wells.

The former production well was abandoned by inserting 1.5-inch diameter flexible polypropylene pipe from surface to the bottom of the well, approximately 368-feet below ground surface. A cement-mixer truck was brought onto the Site for the purpose of providing cement grout for the

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abandonment of the former production well. The cement grout was produced by mixing 24,440 pounds of cement with approximately 1,560 gallons of water. The grout was slowly poured via a trough into the drillers mud tub and then pumped through the 1.5 inch diameter tremie pipe that was inserted to the base of the production well. A second pump was used to remove the displaced groundwater from the casing and direct it to the lagoon area via polypropylene piping. The NJDEP well abandonment report form was submitted to the NJDEP Bureau of Water Allocation by JCA.

## **2.3 SOIL SAMPLING AND ANALYSIS**

As recommended by NJDEP in its November 8, 1995 letter, additional investigation was completed west and northwest of monitoring well MW-3L to determine if the dichlorobenzene and phenol detected in this well originate from a source in this area. As agreed between SCCC and NJDEP at the February 4, 1998 meeting, two soil borings (SB-15 and SB-16) were completed for this purpose. Soil boring SB-15 was located between the guardhouse on the northern property boundary and Building #1. Soil boring SB-16 was located near the western property boundary. The locations of the soil borings are shown on Figure 2-2.

The soil borings were completed from ground surface to the top of the varved clay layer. Drilling of the borings was accomplished with a Failing F-7 drilling rig. The two soil borings were completed through the use of 3-1/4-inch inside diameter (ID) hollow stem augers (HSA) and continuous split spoon sampling.

All soil samples were visually screened for evidence of potential constituent impact. Soil samples were also screened for the presence of organic vapors with an H-Nu photo-ionization detector (PID) or an Organic Vapor Monitor (OVM). No visual evidence of impact or elevated PID or OVM readings were observed in any of the soil samples. Both soil borings were tremie grouted using a cement/bentonite grout mixture immediately upon their completion. Soil boring logs are presented in Appendix A.

Three soil samples per boring were submitted to STL for laboratory analysis for SVOCs by EPA Method 8270. These soil samples were collected at the following depths:

- immediately beneath the 1-foot thick crushed stone surface layer;
- immediately above the meadow mat layer; and,
- immediately above the varved clay layer.

The purpose of collecting the near surface soil sample was to examine for the presence of a surficial source at these locations. The purpose of analyzing the sample collected from directly above the meadow mat was to examine the material for the potential presence of SVOCs within the fill unit.

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The purpose of the soil sample collected from immediately above the varved clay was to examine for the potential presence of constituents migrating within the sand unit along the surface of the confining clay from an upslope source.

In addition, two soil samples were collected for laboratory analysis at each of the two new monitoring well locations (MW-16L and MW-17L). These soil samples were collected from the 0 to 2-foot interval and from the soils located immediately on top of the meadow mat layer. Soil samples were not collected at the top of the varved clay layer as the groundwater monitoring well was screened in this zone and the data obtained through the soil analyses would be redundant with the groundwater analyses conducted at these locations.

## 2.4 MONITORING WELL INSTALLATION

Two groundwater monitoring wells (MW-16L and MW-17L) were installed within the sand unit in the western portion of the Site to define the extent of constituents in groundwater in the vicinity of monitoring well MW-3L. Groundwater monitoring well MW-16L was located northwest of MW-3L near the guardhouse on the western property boundary. Groundwater monitoring well MW-17L was located southeast of MW-3L near the southern property boundary. The locations of these monitoring wells are shown on Figure 2-2.

Borings for the monitoring well installation were completed using HSA and fluid rotary drilling techniques. Continuous split-spoon soil sampling was performed at both monitoring well locations to define the stratigraphy at the well locations. Hollow stem auger drilling methods were used from ground surface to an elevation below the top of the meadow mat. A 6-inch diameter steel casing was inserted into the aquitard and was grouted in place with a cement/bentonite mixture. The grout was allowed to cure for a minimum of 72-hours before the borehole was further advanced. The boring was then completed to the top of the varved clay using fluid rotary drilling techniques.

All groundwater monitoring wells were installed with the base of the screen located at an elevation slightly below the top of the varved clay layer to allow for detection of a DNAPL layer, if present. Groundwater monitoring well MW-16 was completed with a five foot long screen, whereas monitoring well MW-17L was constructed with a 3-foot long screen. The screen at location MW-17L was shorter due to the limited thickness of sand unit between the base of the meadow mat and the top of the varved clay at this location. A sand filter was installed between the well screen and the borehole wall to an elevation above the top of the well screen. Both monitoring wells were constructed with a 2-foot minimum bentonite seal located above the sand filter. The seal was constructed of bentonite pellets which were allowed to hydrate for a minimum of 30-minutes before continuing with the well construction. Cement/bentonite grout was then tremied from the top of the

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bentonite to within 2-feet of ground surface. Concrete pads were constructed at the ground surface and were sloped away from the well to prevent surface water infiltration through the well. Flush mount covers with locking inner plugs were installed to secure the wells.

The two newly installed groundwater monitoring wells were developed on January 20, 1999 using a Whale submersible pump. Twenty and sixteen well casing volumes of groundwater were removed from monitoring wells MW-16L and MW-17L, respectively. Groundwater field parameters were monitored during the development process using a Horiba meter. These measurements included temperature, pH, salinity, turbidity, conductivity and dissolved oxygen. KEY field personnel noted the presence of an emulsified NAPL during the development of groundwater monitoring well MW-17L. The presence of the emulsified NAPL in the development fluids at location MW-17L prevented further monitoring of the groundwater quality parameters with the Horiba to prevent damage to this instrument.

## **2.5 GROUNDWATER SAMPLING**

Groundwater sample collection was performed on February 2, 1999 at locations MW-16L and MW-17L. Purging and sampling was performed using a peristaltic pump. Low flow sampling techniques were utilized to minimize sample turbidity. Dedicated tubing was used during groundwater sampling such that decontamination of field equipment was not necessary. The KEY field personnel noted that DNAPL was not encountered at location MW-17L during purging or sampling.

A field duplicate was collected at Well MW-17L. A field blank was also collected. All samples were shipped overnight to STL. The groundwater samples were analyzed for SVOC using EPA Method 625.

## **2.6 ROST™ INVESTIGATION**

The purpose of the ROST™ investigation was to further delineate the extent of DNAPL in the fill material and underlying sand unit. A ROST™-equipped cone penetrometer system, that utilizes laser light to fluoresce hydrocarbon-based chemicals present in the subsurface, was used for this task. Fugro Geosciences, Inc. (Fugro) of Houston, Texas was subcontracted by KEY to provide this service.

The laser light is introduced to the subsurface soils through a sapphire window present on the side of the cone penetrometer. The fluorescence of the hydrocarbons in the subsurface is detected by a photoelectric cell and the signal is processed in a computer located in the cone penetrometer truck. The computer measures the intensity of the fluorescence and the wave spectrum of the signal. The

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wave spectrum of the response is used to provide a qualitative assessment of the chemical composition of the observed NAPL. The wave spectral analysis is referred to as a wavelength time matrix (WTM). The WTM monitors four wavelengths at 340, 390, 440 and 490 nanometers (nm). The relative intensity of the fluorescence, when calibrated to the chemical composition of the NAPL can provide a qualitative estimate of the relative concentration of that NAPL in the subsurface.

Thirty-one ROST™ soundings were completed during this investigation. ROST™ locations are shown on Figure 2-3. The ROST™ testing was predominantly performed in the vicinity of the former lagoon located in the eastern area of the Site, and around Buildings 2, 3 and 4. Six additional ROST™ locations were added in the field to assist in the delineation of suspected NAPL in the subsurface. These locations were added between the former lagoon and Buildings 3 and 4. ROST™ sample locations were also added between Building #2 and the abandoned warehouse building. A ROST™ test was also performed adjacent to location SB-15 to examine the instrument response at a location where no NAPL was observed in the subsurface.

ROST™ data were acquired at approximately one-inch depth intervals from surface to the top of the varved clay. The CPT rods were removed from the subsurface at the completion of ROST™ data collection. The open hole was then immediately tremie grouted using a cement/bentonite mixture. Fugro dedicated a man to operating a portable mixer and pump for the tremie grouting of the ROST™ borings. The pump, mixer and tremie pipe were loaded onto a trailer and towed behind a pickup truck. The pickup truck followed the CPT such that it could occupy a ROST™ boring immediately after it was vacated. Tremie grouting was performed under the supervision of a licensed New Jersey driller to insure that it was properly completed.

Several drops of DNAPL were obtained from locations MW-3L, MW-8L, MW-12L, MW-13L and MW-14L. These samples were placed on the ROST™ for purposes of calibrating the results to the Site conditions.

Four additional HSA soil borings were performed at ROST™ locations R-8, R-24, R-26 and R-30. The purpose of the additional borings was to confirm the presence or absence of DNAPL as indicated by the ROST™ data. The borings were advanced to the depth at which DNAPL was observed with the ROST™. A split spoon sample was then obtained at that depth and visually examined for the presence of NAPL. The sample was then placed in a jar and a headspace analysis was performed using a PID to qualitatively determine the presence or absence of free phase and dissolved compounds. NAPL was observed at locations R-8, R-24 and R-26. DNAPL was not observed at location R-30. The boreholes were then immediately tremie grouted upon completion using a cement bentonite grout.

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## **2.7 DNAPL RECOVERY EVALUATION**

A DNAPL recovery evaluation was performed over a two-week period (February 3 to February 16, 1999) to determine the feasibility of DNAPL recovery from the sand unit using existing monitoring wells. The four groundwater monitoring wells containing a measurable DNAPL layer (MW-3L, MW-8L, MW-12L and MW-13L) were used for this evaluation.

Prior to the initial DNAPL removal event, the apparent DNAPL thickness in each well was measured using an oil/water interface probe. The DNAPL was removed from these wells using a peristaltic pump and the volume of DNAPL removed was measured in a calibrated bucket. Following evacuation of the DNAPL, the DNAPL recovery in the wells was monitored. Once the DNAPL thickness had returned to a level at or near its pre-test thickness, the DNAPL was again removed. This process was repeated several times during the two-week testing period.

## **2.8 SITE SURVEY**

A Site survey was performed by Neglia and Associates, a New Jersey licensed professional surveyor. All ROST™ sounding and soil boring locations were surveyed to determine their horizontal and ground surface elevation. The newly installed groundwater monitoring wells were surveyed to determine the top-of-casing elevation, as well as, horizontal coordinates and ground surface elevation. Survey data is included in Appendix C. The surveyor also obtained the location of several building corners for the purpose of adjusting the base map that was believed to have been created from a non-stereo rectified aerial photograph. The location of the top of the lagoon berm and the elevation of the lagoon water surface were also obtained during this surveying effort.

All survey data were obtained in New Jersey State Plane Coordinates and in units of feet. The data were referenced to the horizontal North American Datum of 1983 (NAD83) and the North American Vertical Datum of 1988 (NAVD88).



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### 3.0 SUPPLEMENTAL REMEDIAL INVESTIGATION RESULTS

The findings of the SRI field activities are described in this section. Soil data are compared to both the New Jersey Non-Residential Direct Contact Soil Cleanup Criteria (NRDCSCC), the Residential Direct Contact Soil Cleanup Criteria (RDCSCC), and the Impact to Groundwater Soil Cleanup Criteria (IGWSCC). Groundwater data are compared the New Jersey Class II-A Groundwater Quality Criteria (GWQC). One copy of the analytical data packages received from the laboratory has been forwarded to the NJDEP Case Manager under separate cover, as allowed for under N.J.A.C. 7:26E-3,13(c).

#### 3.1 TRANSFORMER AREA SOIL SAMPLING AND ANALYSIS

The results of the PCB analyses are summarized in Table 3-1. The primary PCB analyses was performed using EPA Method 8081. Analyses by EPA Method 8082 was used for confirmational purposes. Comparison of the data presented on Table 3-1 indicate agreement of the concentrations measured by the two methods.

The analytical results indicate that the PCB concentration measured in the concrete chip sample exceeds the NRDCSCC. A total PCB concentration of 6.800 mg/kg was measured in this sample. This concentration was entirely attributable to the presence of PCB-1260. Total PCB concentrations in the three surface soil samples collected in this area were less than the RDCSCC. Therefore, no further investigation of the presence of PCB in the transformer area is necessary.

#### 3.2 MW-3L AREA SOIL SAMPLING AND ANALYSIS

The soil samples from the soil borings completed in the MW-3L area in January 1999 were analyzed for SVOCs. The results of these analyses are summarized in Table 3-2. The primary objective of the sampling and analysis program was to provide data to support an evaluation of the source of constituents previously detected in groundwater in monitoring well MW-3L. Also, the results of these analyses provide useful information for defining surface and subsurface soil conditions for the western portion of the SCCC Site. The following points summarize the soil analytical results:

- Concentrations of all SVOCs in the surface soil samples from locations SB-16, MW-16L and MW-17L are less than the RDCSCC. Benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene and bis(2-ethylhexyl)phthalate (BEHP) were detected at concentrations greater than the RDCSCC in the surface soil sample collected from SB-15. However, the concentrations of benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene are less than the NRDCSCC. The

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BEHP concentration is slightly greater than the NRDCSCC. Only one location (SB-15), at the 0-2 foot interval, exceeds the New Jersey IGWSCC. The only constituents to exceed the IGWSCC in this sample are BEHP and di-n-octyl phthalate.

- Concentrations of all SVOCs in the soil samples collected from directly above the meadow mat at locations SB-15, SB-16, MW-16L and MW-17L are less than the RDCSCC. The results of these analyses indicate that a constituent source within the fill materials does not exist at these locations. This also indicates that migration of SVOCs observed in the surface soils at location SB-15 has not occurred.
- Concentrations of all SVOCs in the soil samples collected from directly above the varved clay at locations SB-15 and SB-16 are less than the RDCSCC. The results of these analyses indicate that these borings are not located along a constituent migration pathway within the sand unit.
- Based on the soil analytical results, further delineation of the extent of constituents in surface soils in the western portion of the SCCC Site is not necessary particularly since the Site is zoned industrial.

### 3.3 GROUNDWATER SAMPLING AND ANALYSIS

The groundwater samples collected from new monitoring wells MW-16L and MW-17L were analyzed for SVOCs. The results of these analyses are summarized in Table 3-3. The objective of the groundwater sampling and analysis program was to provide additional data for evaluation of the extent of constituents in groundwater in the sand unit in the general vicinity of monitoring well MW-03. The following points summarize the groundwater analytical results:

- Concentrations of all SVOCs, with the exception of 1,4-dichlorobenzene, were less than the GWQC in monitoring well MW-16L. The concentration of 1,4-dichlorobenzene in this sample was 540 ug/l.
- Concentrations of the three dichlorobenzene isomers and 1,2,4-trichlorobenzene were detected at concentrations greater than the GWQC Class IIA in monitoring well MW-17L.

Monitoring wells MW-16L and MW-17L are located along the western and southern boundaries, respectively. Additional groundwater characterization within the western portion of the SCCC Site is not warranted.

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### 3.4 GROUNDWATER FLOW

The depth to groundwater was measured in site monitoring wells prior to the groundwater sampling event. These data were used to calculate potentiometric elevations at each monitoring well location. The data are summarized on Table 3-4. The potentiometric elevation data for groundwater in the fill unit and sand unit were contoured for interpretation of groundwater flow directions. The potentiometric surface elevation contour maps for the fill unit and sand unit are included as Figures 3-1 and 3-2, respectively.

Groundwater flow patterns observed in the fill unit are consistent with those observed in the past. A potentiometric mound is present in the vicinity of the lagoon. Shallow groundwater flows radially outward from this mound. In areas beyond the influence of the potentiometric mound, groundwater in the fill appears to flow in a southerly direction, approximately parallel to the Hackensack River, under the influence of a relatively flat horizontal hydraulic gradient.

Groundwater flow patterns observed in the sand unit were also consistent with those previously observed. A potentiometric mound is present in the area to the northwest of the lagoon. Groundwater flow from this mound is to the east and the south. The horizontal hydraulic gradients in the vicinity of the lagoon appear to be greater than those indicated in other areas of the property. This depiction may be due to tidal influences in the area of monitoring wells MW-8L and MW-9L. In areas beyond the influence of the potentiometric mound, groundwater in the sand appears to flow in a southeasterly direction, sub-parallel to the Hackensack River, under the influence of a relatively flat horizontal hydraulic gradient. The difference in potentiometric elevations across the Site in areas not affected by the mound and tidal influences is only 0.5 feet.

### 3.5 ROST™ SURVEY RESULTS

The evaluation of the distribution of DNAPL in the fill and sand units at the Site was further evaluated by performing ROST™ soundings at 31 locations. At each location, the soundings were advanced to an elevation below the contact to between the sand unit and the underlying varved clay to allow for an evaluation of DNAPL presence at the base of the sand unit.

The inferred presence of DNAPL in the subsurface was made based on elevated fluorescence intensity and a match of a characteristic fluorescence multi-length waveform. At the SCCC Site, two characteristic fluorescence waveforms were identified that, when detected in conjunction with elevated fluorescence intensities, are interpreted to be indicative of DNAPL presence. These characteristic fluorescence signatures are shown on Figure 3-3.

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One DNAPL signature is characterized by the maximum fluorescence intensity emitted at a wavelength of 440 nm. This DNAPL signature was, for the most part, more prevalent in the ROST™ soundings completed in the vicinity of Buildings 2, 3, and 4. Based on the groundwater analytical data for samples collected in this area, this DNAPL is believed to be comprised primarily of the dichlorobenzene isomers.

The other DNAPL signature is characterized by maximum fluorescence intensity emitted at a wavelength of 390 nm. This DNAPL signature was, for the most part, more prevalent in the ROST™ soundings completed in the eastern portion of the Site in the vicinity of the lagoon. Based on the groundwater analytical data for samples collected in this area, this DNAPL is believed to be comprised primarily of the dichlorobenzene isomers, naphthalene and trichlorobenzene isomers.

### 3.5.1 DNAPL Distribution in the Fill Unit

Figure 3-4 shows the locations where the ROST™ data indicates the presence of DNAPL in the shallow unit. The ROST™ indicates the presence of DNAPL at three sounding locations (R-3, R-4, and R-7) in the vicinity of Buildings 2, 3 and 4. The possible presence of DNAPL at these locations is inferred based on elevated fluorescence intensity and a multi-wavelength signature showing the greatest fluorescence emitted at a wavelength of 440 nm. At these three locations, the DNAPL appears as a very thin layer (less than 1 ft.) perched on top of the meadow mat. As indicated on Figure 3-4, the distribution of DNAPL in the fill unit in this area is limited in extent as the ROST™ data from surrounding borings in this area do not indicate the presence of DNAPL.

To confirm the limited extent of DNAPL in the fill unit in the vicinity of Buildings 2, 3, and 4, information from previous investigations was reviewed. This information includes visual observations and analytical data from soil borings and monitoring wells completed during the Weston RI. Information acquired from Weston borings SB-1 through SB-4 and monitoring well MW-15U do not suggest the presence of DNAPL at these locations. Based on the ROST™ data and information from the Weston RI, DNAPL in the fill unit in the vicinity of Buildings 2, 3 and 4 has not migrated laterally.

The ROST™ data indicate the possible presence of DNAPL in the fill unit at three locations (R-12, R-15 and R-16) in immediately adjacent to the lagoon. At these locations, the presence of DNAPL is indicated by a different fluorescence signature than the DNAPL observed in the vicinity of Building 4, with the greater fluorescence emitted at a wavelength of 390 nm. The DNAPL at locations R-12 and R-15 appears as a thin layer perched on top of the meadow mat. As indicated on Figure 3-4, the distribution of DNAPL in the fill unit in this area is limited in extent as the ROST™ data from most soundings completed in the vicinity of the lagoon do not indicate the

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presence of DNAPL. These data indicate that lateral migration of DNAPL within the fill unit is minimal.

Boring log information and analytical data from the Weston RI and the ERM FRI verify the limited extent and lateral movement of DNAPL in the fill unit in the vicinity of the lagoon. However, visual observations made by Weston and ERM suggest the presence of a localized source in the fill unit in the vicinity of monitoring well MW-7L and SB-7 located in the vicinity of the northern property boundary.

### 3.5.2 DNAPL Distribution in the Sand Unit

Figure 3-5 shows the locations where the ROST™ data indicates the presence of DNAPL in the sand unit. As indicated on Figure 3-5, DNAPL is more widely distributed in the sand unit than in the overlying fill.

In the vicinity of Buildings 2, 3, and 4, the DNAPL exhibits the same fluorescence characteristics as the DNAPL identified in the shallow zone in this area. The DNAPL appears to be distributed as a very thin layer perched directly on top of the varved clay. The extent of DNAPL in the Building 2, 3 and 4 area is delineated on-Site to the north by ROST™ soundings R-1, R-28 and R-29, to the east by R-30 and R-31 and to the west by MW-16L.

The elevated fluorescence intensity readings in the sand unit in the lagoon area typically correspond to a signature showing the greater fluorescence intensity being emitted at a wavelength of 390 nm. The ROST™ data indicate the extent of DNAPL to the west of the lagoon area has been delineated by soundings R-10, R-30 and R-31. The ROST data indicate that DNAPL is present in the sand unit at the northern property boundary from the northeastern corner of the property to the west to sounding R-24. DNAPL was not detected at sounding R-32 which was completed along the northern property to the west of R-24.

The ROST™ data indicate the presence of DNAPL in the sand unit in the area between the lagoon and the Hackensack River. The inferred DNAPL thicknesses in this area based on the ROST™ data from soundings R-14, R-15, R-16A and R-21, are somewhat greater than those observed in other portions of the Site. DNAPL is also inferred to be present in the area to the south of the lagoon.

### 3.5.3 DNAPL Migration Pathways

The CPT data and drilling results from the January 1999 mobilization were used to create structure maps of the top of the meadow mat and the top of the varved clay (Figures 3-6 and 3-7). The

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structure maps were created through the use of the geostatistical software OASIS Montage. The structure contour map of the meadow map surface indicates that a topographic high exists at the northeastern extreme of the Site. The meadow mat surface appears to gently dip to the southwest towards the former lagoon area. Based on the structure of the meadow map surface in the lagoon area, migration of DNAPL from the lagoon to locations R-12, R-15 and R-16 is possible. Soundings R-12 and R-15 appear to be located within a slight depression within the upper surface of the meadow mat. The low relief on the top of the meadow mat surface in the vicinity of the former lagoon area is consistent with the limited extent of lateral DNAPL migration within this unit.

In the Building 4 area, soundings R-3 and R-4, where the presence of DNAPL was inferred in the fill unit, are located at a local topographic high in the meadow mat surface. This information suggests that these soundings were completed in close proximity to a DNAPL source. The dip of the meadow mat surface to the south in this area is consistent with the inferred presence of DNAPL in the fill unit at location R-7.

The structure contour map for the top of the varved clay unit indicates that this surface slopes to the northeast and northwest in the vicinity of the lagoon area. This is consistent with the distribution of DNAPL in this area. In the vicinity of Buildings 2, 3, and 4, the varved clay unit dips from a local high at the inferred source area near sounding R-3 to the southwest towards well MW-3L and MW-17L. The slope of this surface is consistent with the presence of DNAPL in well MW-3L.

The vertical distribution of DNAPL is depicted on geologic cross-sections A-A', B-B' and C-C'. The plan location of the cross-sections are shown as Figure 3-8 and the cross-sections are presented as Figures 3-9A through 3-9C. The geologic cross-sections are based on the CPT data and the drilling data acquired during the January 1999 mobilization. The results of the ROST™ logs are overlain onto the cross sections to depict the relationship between DNAPL presence and Site stratigraphy.

### **3.6 DNAPL RECOVERY EVALUATION**

The results of the DNAPL recovery evaluation indicate that removal of DNAPL from the sand unit using existing wells (MW-3L, MW-8L, MW-12L and MW-13L) is feasible. The total volume of DNAPL recovered from individual wells over the two week test period ranged from 7.2 gallons from monitoring well MW-8L to 12.55 gallons from monitoring well MW-3L. Thus, DNAPL recovery rates range from approximately 0.5 gallons to 1 gallon per day. Data recorded during the DNAPL recovery data is included in Appendix D:



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#### 4.0 CONCLUSIONS AND RECOMMENDATIONS

The objectives of the SRI were met through the implementation of the field activities described in this report. The surface soil sampling conducted in the transformer area completed the delineation of PCBs and confirmed the limited extent of impacted media in this area.

The soil sampling and analysis program completed the characterization of soil conditions in the western area. These data indicate that a source area does not exist in the extreme western portion of the SCCC Site. These data also indicate that potential impact to surface soils in this portion of the Site is limited to the vicinity of SB-15.

The on-Site characterization of groundwater in the western portion of the facility was completed through installation and sampling of monitoring wells MW-16L and MW-17L. Elevated levels of dichlorobenzene isomers were detected in monitoring well MW-17L. These constituents are likely attributable to the DNAPL present in the sand unit at location MW-3L.

The CPT/ROST™ survey further defined DNAPL source areas, potential migration pathways and distribution in the fill and sand units. The ROST™ data indicate that lateral movement of DNAPL within the fill unit is limited. These data indicate that the distribution of DNAPL in this zone remains in close proximity to the suspected source areas (the lagoon and Buildings 2 and/or 4 areas). In most instances, the DNAPL identified in the shallow unit exists as a thin layer perched directly above the meadow mat. No further investigation regarding the lateral extent of DNAPL in the fill unit is recommended at this Site.

The ROST™ data indicate that the extent of DNAPL in the sand unit is more widespread than in the overlying fill unit. The movement of DNAPL in the sand unit appears to be controlled somewhat by the slope of the top of the underlying varved clay unit. In the lagoon area, DNAPL appears to have migrated along the top of clay to the northeast and the northwest. DNAPL was also observed to be present south of the lagoon in areas where the varved clay is at a topographic high. Significant DNAPL migration also appears to have occurred from the Buildings 2 and/or 4 areas to the southwest to the location of monitoring well MW-3L. The top of the varved clay slopes downward, from the Buildings 2 and/or 4 area, towards MW-3L and MW-17L.

The results of the DNAPL recovery evaluation demonstrate that DNAPL can be removed from the sand unit cost-effectively and efficiently using the existing monitoring wells.

With the data acquired through implementation of the SRI, sufficient information exists to prepare a Remedial Action Selection Report (RASR) for the Site. In accordance with the ACO, the RASR

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will be submitted to NJDEP within 90 days of receipt of written approval of this SRI Report from NJDEP. In conjunction with preparation of the RASR, limited additional field data may be acquired to support remedy selection and/or design. Also, SCCC will initiate the removal of DNAPL from existing monitoring wells MW-3L, MW-8L, MW-12L and MW-13L through the RASR and RAWP preparation.

A summary of the SRI conclusions for this Site is as follows:

1. The objectives of the SRI were met through the implementation of the field activities described in this report.
2. The former production well was successfully abandoned by a licensed New Jersey drilling subcontractor.
3. A source area does not exist in the extreme western area of the Site.
4. On-Site characterization of the groundwater at the western portion of the Site was completed through the installation and sampling of monitoring wells MW-16L and MW-17L.
5. The CPT/ROST™ survey indicated that the suspected DNAPL source areas for this Site are the lagoon, and Building 2 and/or Building 4.
6. CPT/ROST™ survey data indicated that the lateral extent of DNAPL in the fill unit is limited and not extensive.
7. CPT/ROST™ survey indicated that where DNAPL is present in the fill unit it exists as a thin perched layer located immediately above the meadow mat.
8. CPT/ROST™ survey indicated that the presence or absence of DNAPL in the sand layer is partly controlled by the slope of the surface of the varved clay unit relative to the suspected source areas.
9. The ROST™ results for the area south of the lagoon are not consistent with previous investigations, analytical results, or the topographic surface of the varved clay.
10. This SRI indicated that modest DNAPL recovery within the sand layer can be accomplished through the existing groundwater monitoring well network.

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11. Sufficient data exists to prepare a RASR for this Site.

A summary of the SRI recommendations for this Site is as follows:

1. No further sampling is required at the former PCB transformer area as the limited extent of impacted media at this location was sufficiently delineated as part of this SRI.
2. No further sampling is required in the western portion of the Site as our most recent analytical data indicates that a source area does not exist within this area.
3. No further investigation of the lateral extent of DNAPL in the fill unit is recommended as our most recent CPT/ROST™ has sufficiently defined its limited extent.
4. Low volume DNAPL recovery using the existing groundwater monitoring wells should be considered as an efficient and cost effective method for removing DNAPL from the sand layer.
5. Low volume DNAPL recovery using the existing groundwater monitoring wells should continue through the RASR and the RAWP preparation.



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**TABLES**

TABLE 2-1A

FORMER PRODUCTION WELL  
GROUNDWATER ANALYTICAL RESULTS FOR VOLATILE ORGANIC COMPOUNDS  
STANDARD CHLORINE CHEMICAL COMPANY  
KEARNY, NEW JERSEY

SITE:		SC-PW	SC-PW	SC-PW
DATE:		10/8/98	10/8/98	10/8/98
DEPTH (ft):		88	228	360
CONSTITUENT:	UNITS			
1,1,1-Trichloroethane	ug/L	0.5 U	0.5 U	0.5 U
1,1,2,2-Tetrachloroethane	ug/L	0.9 U	0.9 U	0.9 U
1,1,2-Trichloroethane	ug/L	1.9 U	1.9 U	1.9 U
1,1-Dichloroethane	ug/L	0.6 U	0.6 U	0.6 U
1,1-Dichloroethylene	ug/L	1.1 U	1.1 U	1.1 U
1,2-Dichloroethane	ug/L	1.3 U	1.3 U	1.3 U
1,2-Dichloropropane	ug/L	0.5 U	0.5 U	0.5 U
2-Hexanone	ug/L	3 U	3 U	3 U
Acetone	ug/L	38 B	10 B	6.2 JB
Benzene	ug/L	0.7 U	0.7 U	0.7 U
Bromodichloromethane	ug/L	0.8 U	0.8 U	0.8 U
Bromoform	ug/L	2.5 U	2.5 U	2.5 U
Carbon disulfide	ug/L	2.4 U	2.4 U	2.4 U
Carbon tetrachloride	ug/L	1 U	1 U	1 U
Chlorobenzene	ug/L	1.1 U	1.1 U	1.1 U
Chloroethane	ug/L	1.3 U	1.3 U	1.3 U
Chloroform	ug/L	0.8 U	0.8 U	0.8 U
cis-1,2-Dichloroethylene	ug/L	0.8 U	0.8 U	0.8 U
cis-1,3-Dichloropropene	ug/L	0.7 U	0.7 U	0.7 U
Dibromochloromethane	ug/L	1.7 U	1.7 U	1.7 U
Ethylbenzene	ug/L	2.2 U	2.2 U	2.2 U
Methyl bromide	ug/L	2.3 U	2.3 U	2.3 U
Methyl chloride	ug/L	7.7 U	7.7 U	7.7 U
Methyl ethyl ketone	ug/L	2.5 JB	2.4 JB	2.5 U
Methyl isobutyl ketone (MIBK)	ug/L	2.7 U	2.7 U	2.7 U
Methylene chloride	ug/L	1.2 U	1.2 U	1.2 U
Styrene	ug/L	1.8 U	1.8 U	1.8 U
Tetrachloroethylene	ug/L	0.8 U	0.8 U	0.8 U
Toluene	ug/L	0.8 U	0.8 U	0.8 U
trans-1,2-Dichloroethene	ug/L	0.7 U	0.7 U	0.7 U
trans-1,3-Dichloropropene	ug/L	1.5 U	1.5 U	1.5 U
Trichloroethylene	ug/L	0.6 U	0.6 U	0.6 U
Vinyl chloride	ug/L	1.2 U	1.2 U	1.2 U
Xylenes	ug/L	1.3 U	1.3 U	1.3 U

U - indicates compound not detected at listed detection limit.

B - indicates compound detected in associated blank.

J - indicates estimated concentration less than the method detection limit.

TABLE 2-1B

## FORMER PRODUCTION WELL

GROUNDWATER ANALYTICAL RESULTS FOR SEMI-VOLATILE ORGANIC COMPOUNDS  
STANDARD CHLORINE CHEMICAL COMPANY  
KEARNY, NEW JERSEY

SITE: DATE: DEPTH (ft):		SC-PW 10/8/98 88	SC-PW 10/8/98 228	SC-PW 10/8/98 360
CONSTITUENT:	UNITS			
<b>SEMI-VOLATILES</b>				
1,2,4-Trichlorobenzene	ug/L	0.44 U	0.44 U	0.44 U
2,4,5-Trichlorophenol	ug/L	0.42 U	0.42 U	0.42 U
2,4,6-Trichlorophenol	ug/L	0.58 U	0.58 U	0.58 U
2,4-Dichlorophenol	ug/L	0.54 U	0.54 U	0.54 U
2,4-Dimethylphenol	ug/L	0.54 U	0.54 U	0.54 U
2,4-Dinitrophenol	ug/L	12 U	12 U	12 U
2,4-Dinitrotoluene	ug/L	0.28 U	0.28 U	0.28 U
2,6-Dinitrotoluene	ug/L	0.39 U	0.39 U	0.39 U
2-Chloronaphthalene	ug/L	0.42 U	0.42 U	0.42 U
2-Chlorophenol	ug/L	0.85 U	0.85 U	0.85 U
2-Methylnaphthalene	ug/L	0.34 U	0.34 U	0.34 U
3,3-Dichlorobenzidine	ug/L	3.6 U	3.6 U	3.6 U
4,6-Dinitro-o-cresol	ug/L	0.45 U	0.45 U	0.45 U
4-Bromophenyl phenyl ether	ug/L	0.6 U	0.6 U	0.6 U
4-Chlorophenyl phenyl ether	ug/L	0.4 U	0.4 U	0.4 U
Acenaphthene	ug/L	0.48 U	0.48 U	0.48 U
Acenaphthylene	ug/L	0.38 U	0.38 U	0.38 U
Anthracene	ug/L	0.41 U	0.41 U	0.41 U
Benzo(a)anthracene	ug/L	2.2	2.4	3
Benzo(a)pyrene	ug/L	3.8	4.4	5.6
Benzo(b)fluoranthene	ug/L	5.2	4.9	6.9
Benzo(ghi)perylene	ug/L	3.5	4.2	5.3
Benzo(k)fluoranthene	ug/L	1.3	1.9	2.2
Bis(2-chloro-1-methylethyl) ether	ug/L	0.68 U	0.68 U	0.68 U
Bis(2-chloroethoxy)methane	ug/L	0.39 U	0.39 U	0.39 U
Bis(2-chloroethyl)ether	ug/L	0.28 U	0.28 U	0.28 U
Bis(2-ethylhexyl)phthalate (BEHP)	ug/L	1.9	5.4	5.8
Butyl benzyl phthalate	ug/L	0.54 U	0.54 U	0.54 U
Carbazole	ug/L	0.41 U	0.41 U	0.41 U
Carbolic acid	ug/L	0.45 U	0.45 U	0.45 U
Chrysene	ug/L	2.6	3	4.1
Dibenzo(a,h)anthracene	ug/L	0.47 U	0.47 U	1
Dibenzofuran	ug/L	0.42 U	0.42 U	0.42 U
Diethyl phthalate	ug/L	0.45 U	0.45 U	0.45 U
Dimethyl phthalate	ug/L	0.43 U	0.43 U	0.43 U
Di-n-butyl phthalate	ug/L	0.85 U	0.85 U	0.85 U

TABLE 2-1B

FORMER PRODUCTION WELL  
GROUNDWATER ANALYTICAL RESULTS FOR SEMI-VOLATILE ORGANIC COMPOUNDS  
STANDARD CHLORINE CHEMICAL COMPANY  
KEARNY, NEW JERSEY

SITE: DATE: DEPTH (ft):		SC-PW 10/8/98 88	SC-PW 10/8/98 228	SC-PW 10/8/98 360
CONSTITUENT:	UNITS			
<b>SEMI-VOLATILES (Continued)</b>				
Di-n-octyl phthalate	ug/L	0.43 U	0.43 U	0.43 U
Fluoranthene	ug/L	2.8	3	3.7
Fluorene	ug/L	0.33 U	0.33 U	0.33 U
Hexachlorobenzene	ug/L	0.39 U	0.39 U	0.39 U
Hexachlorobutadiene	ug/L	0.54 U	0.54 U	0.54 U
Hexachlorocyclopentadiene	ug/L	1.5 U	1.5 U	1.5 U
Hexachloroethane	ug/L	0.5 U	0.5 U	0.5 U
Indeno(1,2,3-cd)pyrene	ug/L	2.8	3.4	4.3
Isophorone	ug/L	0.3 U	0.3 U	0.3 U
m-Dichlorobenzene	ug/L	0.5 U	0.5 U	0.5 U
m-Nitroaniline	ug/L	1.4 U	1.4 U	1.4 U
Naphthalene	ug/L	0.38 U	0.38 U	0.38 U
Nitrobenzene	ug/L	0.36 U	0.36 U	0.36 U
N-Nitrosodiphenylamine	ug/L	0.42 U	0.42 U	0.42 U
N-Nitrosodipropylamine	ug/L	0.39 U	0.39 U	0.39 U
o-Cresol	ug/L	0.71 U	0.71 U	0.71 U
o-Dichlorobenzene	ug/L	0.61 U	0.61 U	0.61 U
o-Nitroaniline	ug/L	0.43 U	0.43 U	0.43 U
o-Nitrophenol	ug/L	0.58 U	0.58 U	0.58 U
p-Chloroaniline	ug/L	0.25 U	0.25 U	0.25 U
p-Chloro-m-cresol	ug/L	0.57 U	0.57 U	0.57 U
p-Cresol	ug/L	0.24 U	0.24 U	0.24 U
p-Dichlorobenzene	ug/L	0.59 U	0.59 U	0.59 U
Pentachlorophenol	ug/L	0.48 U	0.48 U	0.48 U
Phenanthrene	ug/L	1.3	1.3	1.6
p-Nitroaniline	ug/L	0.35 U	0.35 U	0.35 U
p-Nitrophenol	ug/L	4.9 U	4.9 U	4.9 U
Pyrene	ug/L	2.6	3	0.43 U

U - indicates compound not detected at listed detection limit.

TABLE 2-1C

FORMER PRODUCTION WELL  
GROUNDWATER ANALYTICAL RESULTS FOR METALS  
STANDARD CHLORINE CHEMICAL COMPANY  
KEARNY, NEW JERSEY

SITE: DATE: DEPTH (ft):		SC-PW 10/8/98 88	SC-PW 10/8/98 228	SC-PW 10/8/98 360
CONSTITUENT:	UNITS			
Aluminum	ug/L	798	527	533
Antimony	ug/L	2.31 B	1.7 B	1.65 B
Arsenic	ug/L	2.12 B	1.525 U	1.8 B
Barium	ug/L	35.3	67.7	213
Beryllium	ug/L	0.19 B	0.27 B	0.44 B
Cadmium	ug/L	0.215 B	0.125 B	0.125 B
Calcium	ug/L	28300	30500	105000
Chromium	ug/L	989	819	890
Cobalt	ug/L	3.17 B	2.3 B	2.04 B
Copper	ug/L	15.9	33.7	30.6
Iron	ug/L	3590	2630	2070
Lead	ug/L	16.4	12.9	11.6
Magnesium	ug/L	10400	14800	77200
Manganese	ug/L	55.2	33	48.1
Mercury	ug/L	0.2 U	0.2 U	0.2 U
Nickel	ug/L	86.8	65.8	59.3
Potassium	ug/L	17000	14900	37700
Selenium	ug/L	2.63	2.02 B	3.98
Silver	ug/L	0.294 U	0.294 U	0.294 U
Sodium	ug/L	178000	232000	695000
Thallium	ug/L	2.66 B	2.36 B	2.75 B
Vanadium	ug/L	167	163	146
Zinc	ug/L	52.8	43.5	38.3

U - indicates compound not detected at listed detection limit.

B - indicates reported concentration is greater than the instrument detection limit but less than the contract required detection limit.

TABLE 3-1

**SOIL ANALYTICAL RESULTS FOR PCB's  
STANDARD CHLORINE CHEMICAL COMPANY  
KEARNY, NEW JERSEY**

CONSTITUENT: (Units in mg/kg)	New Jersey Non-Residential Direct Contact Soil Cleanup Criteria	New Jersey Residential Direct Contact Soil Cleanup Criteria	SITE: DESCRIPTION: DATE: DEPTH (ft): ANALYTICAL METHOD:	TA-CC01 CONCRETE CHIP 10/9/98 0" - 1"		TA-SS01 SURFACE SOIL 10/9/98 0" - 6"		TA-SS02 SURFACE SOIL 10/9/98 0" - 6"		TA-SS03 SURFACE SOIL 10/9/98 0" - 6"	
				8081	8082	8081	8082	8081	8082	8081	8082
PCB-1016				< 340	< 28	< 0.034	< 0.055	< 0.034	< 0.055	< 0.036	< 0.055
PCB-1221				< 340	< 6	< 0.034	< 0.011	< 0.034	< 0.011	< 0.036	< 0.011
PCB-1232				< 340	< 28	< 0.034	< 0.055	< 0.034	< 0.055	< 0.036	< 0.055
PCB-1242				< 340	< 28	< 0.034	< 0.055	< 0.034	< 0.055	< 0.036	< 0.055
PCB-1248				< 340	< 31	< 0.034	< 0.061	< 0.034	< 0.061	< 0.036	< 0.061
PCB-1254				< 340	< 22	< 0.034	< 0.044	< 0.034	< 0.044	< 0.036	< 0.044
PCB-1260				6800	9300	0.15	0.12	0.16	0.29	0.022 J	< 0.076
PCB's (Total)	2	0.49		[6800]	[9300]	0.15	0.12	0.16	0.29	0.022 J	ND

[ ] - Indicates sample concentration greater than New Jersey Non-Residential Soil Cleanup Criteria.

J - Estimated concentration less than the method detection limit.

ND - Not Detected.

TA  
SOIL ANALY  
SEMI-VOLATILE (C  
STANDARD CHLORIN  
KEARNY.

CONSTITUENT: (Units in ug/kg)	NEW JERSEY IMPACT TO GROUNDWATER SOIL CLEANUP CRITERIA	NEW JERSEY NON-RESIDENTIAL DIRECT CONTACT SOIL CLEANUP CRITERIA	NEW JERSEY RESIDENTIAL DIRECT CONTACT SOIL CLEANUP CRITERIA	SITE DATE: DEPTH (ft)	SC-MW-10L 1/13/09 6-2	SC-MW-10L 1/13/09 8-12
Phenol	50000	10000000	10000000		< 380	< 440
Bis(2-chloroethyl) ether	10000	3000	660		< 120	< 140
2-Chlorophenol	10000	5200000	280000		< 380	< 440
1,3-Dichlorobenzene	100000	10000000	5100000		75 J	540
1,4-Dichlorobenzene	100000	10000000	570000		< 120	2000
1,2-Dichlorobenzene	50000	10000000	5100000		76 J	180
2-Methylphenol		10000000	2800000		< 380	< 440
Propane, 2,2'-oxybis[1-chloro-4-methylphenol]		10000000	2800000		< 120	< 140
N-Nitrosodipropylamine	10000	660	660		< 120	< 140
Hexachloroethane	100000	1000000	6000		< 120	< 140
Nitrobenzene	50000	50000	28000		< 120	< 140
Isophorone	50000	10000000	1100000		< 120	< 140
2-Nitrophenol					< 380	< 440
2,4-Dimethylphenol	10000	10000000	1100000		< 380	< 440
Bis(2-chloroethoxy)methane					< 120	< 140
2,4-Dichlorophenol	10000	3100000	170000		< 380	< 440
1,2,4-Trichlorobenzene	100000	1200000	68000		< 120	< 140
Naphthalene	100000	4200000	230000		< 120	< 140
4-Chloroaniline		4200000	230000		< 120	< 140
Hexachlorobutadiene	100000	21000	1000		< 120	< 140
4-Chloro-3-methylphenol	100000	10000000	10000000		< 120	< 140
2-Methylnaphthalene					< 120	< 140
Hexachlorocyclopentadiene	100000	7300000	400000		< 120	< 140
2,4,6-Trichlorophenol	10000	270000	82000		< 380	< 440
2,4,5-Trichlorophenol	50000	10000000	5600000		< 2000	< 2300
2-Chloronaphthalene					< 120	< 140
2-Nitroaniline					< 2000	< 2300
Dimethylphthalate	50000	10000000	10000000		< 120	< 140
Acenaphthylene					62 J	< 140
2,6-Dinitrotoluene					< 120	< 140
3-Nitroaniline					< 2000	< 2300
Acenaphthene	100000	10000000	3400000		< 120	< 140
2,4-Dinitrophenol	10000	2100000	110000		< 2000	< 2300
4-Nitrophenol					< 2000	< 2300
Dibenzofuran					< 120	< 140
2,4-Dinitrotoluene					< 120	< 140
Diethylphthalate	50000	10000000	10000000		< 120	< 140
4-Chlorophenyl phenyl ether					< 120	< 140
Fluorene	100000	10000000	2300000		< 120	< 140
4-Nitroaniline					< 2000	< 2300
4,6-Dinitro-o-cresol					< 2000	< 2300
N-Nitrosodiphenylamine	100000	600000	140000		< 120	< 140
4-Bromophenyl phenyl ether					< 120	< 140
Hexachlorobenzene	100000	2000	660		< 120	< 140
Pentachlorophenol	100000	24000	6000		< 2000	< 2300
Phenanthrene					210	< 140
Anthracene	100000	10000000	10000000		91 J	< 140
Carbazole					39 J	< 140
Di-n-butyl phthalate	100000	10000000	5700000		< 120	< 140
Fluoranthene	100000	10000000	2300000		480	J
Pyrene	100000	10000000	1700000		410	44 J
Butyl benzyl phthalate	100000	10000000	1100000		< 120	< 140
3,3-Dichlorobenzidine	100000	8000	2000		< 120	< 140
Benzo(a)anthracene	500000	4000	900		280	< 140
Chrysene	500000	40000	9000		280	< 140
Bis(2-ethylhexyl)phthalate (BEHP)	100000	210000	48000		100 J	< 140
Di-n-octyl phthalate	100000	10000000	1100000		< 120	< 140
Benzo(b)fluoranthene	50000	4000	900		450	41 J
Benzo(k)fluoranthene	500000	4000	900		190	< 140
Benzo(a)pyrene	100000	860	860		380	< 140
Indeno(1,2,3-cd)pyrene	600000	4000	900		180	< 140
Dibenzo(a,h)anthracene	100000	660	660		< 120	< 140
Benzo(ghi)perylene					48 J	< 140

[ ] - Indicates sample concentration greater than New Jersey Residential Soil Cleanup Criteria.

J - Estimated concentration less than the method detection limit.

D - Sample concentration determined by analysis of diluted sample.

E - Estimated minimum value, concentration greater than instrument calibration range.

TABLE 3-2

SOIL ANALYTICAL RESULTS  
SEMI-VOLATILE ORGANIC COMPOUNDS  
STANDARD CHLORINE CHEMICAL COMPANY  
KEARNY, NEW JERSEY

NEW JERSEY RESIDENTIAL DIRECT CONTACT SOIL CLEANUP CRITERIA	SITE DATE DEPTH (ft)	SC-MW-16L 1/13/99 0-2	SC-MW-16L 1/13/99 8-12	SC-MW-17L 1/13/99 0-2	SC-MW-17L 1/13/99 10-12	SC-SB15 1/14/99 0-2	SC-SB15 1/14/99 0-2 DILUTED	SC-SB15 1/14/99 8-10
10000000		< 380	< 440	500	< 780	< 410	< 16000	< 1300
880		< 120	< 140	< 130	< 220	< 120	< 5000	< 400
280000		< 380	< 440	< 430	< 730	< 410	< 18000	< 1300
5100000		75 J	540	52	94 J	< 120	< 5000	< 400
570000		< 120	2000	130 J	200 J	< 120	< 5000	< 400
5100000		78 J	190	< 130	< 220	< 120	< 5000	< 400
2800000		< 380	< 440	230 J	< 730	< 410	< 16000	< 1300
		< 120	< 140	< 130	< 220	< 120	< 5000	< 400
2800000		< 380	< 440	< 430	< 730	< 410	< 18000	< 1300
880		< 120	< 140	< 130	< 220	< 120	< 5000	< 400
8000		< 120	< 140	< 130	< 220	< 120	< 5000	< 400
28000		< 120	< 140	< 130	< 220	< 120	< 5000	< 400
1100000		< 120	< 140	< 130	< 220	< 120	< 5000	< 400
		< 380	< 440	< 430	< 730	< 410	< 18000	< 1300
1100000		< 380	< 440	220 J	< 730	< 410	< 16000	< 1300
		< 120	< 140	< 130	< 220	< 120	< 5000	< 400
170000		< 380	< 440	< 430	< 730	< 410	< 16000	< 1300
68000		< 120	< 140	< 130	< 220	< 120	< 5000	< 400
230000		< 120	< 140	40 J	92 J	210	< 5000	< 400
230000		< 120	< 140	< 180	< 220	< 120	< 5000	< 400
1000		< 120	< 140	< 150	< 220	< 120	< 5000	< 400
10000000		< 120	< 140	< 130	< 220	< 120	< 5000	< 400
		< 120	< 140	< 130	< 220	110 J	< 5000	< 400
400000		< 120	< 140	< 130	< 220	< 120	< 5000	< 400
62000		< 380	< 440	< 430	< 730	< 410	< 16000	< 1300
5800000		< 2000	< 2300	< 2200	< 3800	< 2100	< 84000	< 6800
		< 120	< 140	< 130	< 220	< 120	< 5000	< 400
		< 2000	< 2300	< 2200	< 3800	< 2100	< 84000	< 6800
10000000		< 120	< 140	< 130	< 220	< 120	< 5000	< 400
		62 J	< 140	< 130	(69)	130	< 5000	< 400
		< 120	< 140	< 130	< 220	< 120	< 5000	< 400
		< 2000	< 2300	< 2200	< 3800	< 2100	< 84000	< 6800
3400000		< 120	< 140	< 130	520	240	< 5000	< 400
110000		< 2000	< 2300	< 2200	< 3800	< 2100	< 84000	< 6800
		< 2000	< 2300	< 2200	< 3800	< 2100	< 84000	< 6800
		< 120	< 140	< 130	67 J	180	< 5000	< 400
		< 120	< 140	< 130	< 220	< 120	< 5000	< 400
10000000		< 120	< 140	< 130	< 220	< 120	< 5000	< 400
		< 130	< 140	< 130	< 220	< 120	< 5000	< 400
2300000		< 120	< 140	< 130	170 J	240	< 5000	< 400
		< 2000	< 2300	< 2200	< 3800	< 2100	< 84000	< 6800
		< 2000	< 2300	< 2200	< 3800	< 2100	< 84000	< 6800
140000		< 120	< 140	150	< 220	< 120	< 5000	< 400
		< 120	< 140	< 130	< 220	< 120	< 5000	< 400
880		< 120	< 140	< 130	< 220	< 120	< 5000	< 400
8000		< 2000	< 2300	< 2200	< 3800	< 2100	< 84000	< 6800
		210	< 140	170	820	2000	2400 JD	230 J
10000000		91 J	< 140	58 J	280	570	< 5000	< 400
		39 J	< 140	< 130	100 J	360	< 5000	< 400
5700000		< 120	< 140	< 130	< 220	< 120	< 5000	< 400
2300000		480	50 J	380	1200	3100	3500 JD	400
1700000		410	44 J	340	1200	6800	2500 JD	320 J
1100000		< 120	< 140	< 130	< 220	< 120	< 5000	< 400
2000		< 120	< 140	< 130	< 220	< 120	< 5000	< 400
900		280	< 140	240	470	[1500]	[1800] JD	200 J
5000		280	< 140	260	480	6400	1600 JD	200 J
48000		100 J	< 140	75 J	< 220	[120000]	[220000] D	280 J
1100000		< 120	< 140	< 130	< 220	[190000]	[190000] D	< 400
900		450	41 J	480	680	[2200]	[2100] JD	300 J
900		190	< 140	170	95 J	[2200]	< 5000	< 400
660		380	< 140	380	420	< 120	< 5000	210 J
800		190	< 140	< 130	< 220	860	< 5000	< 400
680		< 120	< 140	< 130	< 220	450	< 5000	< 400
		48 J	< 140	210	160 J	200	< 5000	< 400

RESULTS  
COMPOUNDS  
CAL COMPANY

	SC-MW-17L 1/13/99 10-12	SC-SB15 1/14/99 0-2	SC-SB15 1/14/99 0-2 DILUTED	SC-SB15 1/14/99 8-10	SC-SB15 1/14/99 15-18	SC-SB15 1/14/99 0-2	SC-SB15 1/14/99 10-12	SC-SB15 1/14/99 15-18
< 730		< 410	< 16000	< 1300	< 500	< 1600	< 460	< 410
< 220		< 120	< 5000	< 400	< 150	< 470	< 140	< 120
< 730		< 410	< 16000	< 1300	< 500	< 1600	< 460	< 410
94 J		< 120	< 5000	< 400	< 150	< 470	< 140	< 120
200 J		< 120	< 5000	< 400	< 150	< 470	< 140	< 120
< 220		< 120	< 5000	< 400	< 150	< 470	< 140	< 120
< 730		< 410	< 16000	< 1300	< 500	< 1600	< 460	< 410
< 220		< 120	< 5000	< 400	< 150	< 470	< 140	< 120
< 730		< 410	< 16000	< 1300	< 500	< 470	< 140	< 410
< 220		< 120	< 5000	< 400	< 150	320 J	< 140	< 120
< 220		< 120	< 5000	< 400	< 150	< 470	< 140	< 120
< 220		< 120	< 5000	< 400	< 150	< 470	< 140	< 120
< 220		< 120	< 5000	< 400	< 150	< 470	< 140	< 120
< 730		< 410	< 16000	< 1300	< 500	< 1600	< 460	< 410
< 730		< 410	< 16000	< 1300	< 500	360 J	< 460	< 410
< 220		< 120	< 5000	< 400	< 150	< 470	< 140	< 120
< 730		< 410	< 16000	< 1300	< 500	< 1600	< 460	< 410
< 220		< 120	< 5000	< 400	< 150	< 470	< 140	< 120
82 J		210	< 5000	< 400	70 J	240 J	< 140	< 120
< 220		< 120	< 5000	< 400	< 150	< 470	< 140	< 120
< 220		< 120	< 5000	< 400	< 150	< 470	< 140	< 120
< 220		< 120	< 5000	< 400	< 150	< 470	< 140	< 120
< 220		110 J	< 5000	< 400	< 150	< 470	< 140	< 120
< 220		< 120	< 5000	< 400	< 150	< 470	< 140	< 120
< 730		< 410	< 16000	< 1300	< 500	< 1600	< 460	< 410
< 3800		< 2100	< 84000	< 8800	< 2800	< 8100	< 2300	< 2100
< 220		< 120	< 5000	< 400	< 150	< 470	< 140	< 120
< 3800		< 2100	< 84000	< 8800	< 2800	< 8100	< 2300	< 2100
< 220		< 120	< 5000	< 400	< 150	620	< 140	< 120
(68)		130	< 5000	< 400	< 150	< 470	< 140	< 120
< 220		< 120	< 5000	< 400	< 150	< 470	< 140	< 120
< 3800		< 2100	< 84000	< 8800	< 2800	< 8100	< 2300	< 2100
520		240	< 5000	< 400	< 150	< 470	< 140	< 120
< 3800		< 2100	< 84000	< 8800	< 2800	< 8100	< 2300	< 2100
< 3800		< 2100	< 84000	< 8800	< 2600	< 8100	< 2300	< 2100
87 J		160	< 5000	< 400	< 150	< 470	< 140	< 120
< 220		< 120	< 5000	< 400	< 150	< 470	< 140	< 120
< 220		< 120	< 5000	< 400	< 150	< 470	< 140	< 120
< 220		< 120	< 5000	< 400	< 150	< 470	< 140	< 120
170 J		240	< 5000	< 400	< 150	< 470	< 140	< 120
< 3800		< 2100	< 84000	< 8800	< 2800	< 8100	< 2300	< 2100
< 3800		< 2100	< 84000	< 8800	< 2600	< 8100	< 2300	< 2100
< 220		< 120	< 5000	< 400	< 150	< 470	< 140	< 120
< 220		< 120	< 5000	< 400	< 150	< 470	< 140	< 120
< 220		< 120	< 5000	< 400	< 150	< 470	< 140	< 120
< 3800		< 2100	< 84000	< 8800	< 2600	< 8100	< 2300	< 2100
820		2000	2400 JD	230 J	< 160	< 470	< 140	< 120
280		570	< 5000	< 400	< 150	< 470	< 140	< 120
100 J		360	< 5000	< 400	< 150	< 470	< 140	< 120
< 220		< 120	< 5000	< 400	< 150	< 470	< 140	< 120
1200		3100	3500 JD	400	< 150	< 470	< 140	< 120
1200		8900 E	2500 JD	320 J	< 150	< 470	< 140	< 120
< 220		< 120	< 5000	< 400	< 150	< 470	< 140	< 120
< 220		< 120	< 5000	< 400	< 150	< 470	< 140	< 120
470		[1500]	[1800] JD	200 J	< 150	< 470	< 140	< 120
480		6400 E	1600 JD	200 J	< 150	< 470	< 140	< 120
< 220		[120000]	[220000] D	280 J	71 J	< 470	< 140	< 120
< 220		[190000] E	[190000] D	< 400	< 150	< 470	< 140	< 120
680		[2200]	[2100] JD	300 J	< 150	< 470	< 140	< 120
95 J		[2200]	< 5000	< 400	< 150	< 470	< 140	< 120
420		< 120	< 5000	210 J	< 150	< 470	< 140	< 120
< 220		860	< 5000	< 400	< 150	< 470	< 140	< 120
< 220		450	< 5000	< 400	< 150	< 470	< 140	< 120
160 J		200	< 5000	< 400	< 150	< 470	< 140	< 120

TABLE 3-3

GROUNDWATER ANALYTICAL RESULTS  
STANDARD CHLORINE CHEMICAL COMPANY  
KEARNY, NEW JERSEY

CONSTITUENT: (Units in ug/l)	NEW JERSEY CLASS B-A GROUNDWATER QUALITY CRITERIA	SITE: DATE:	SC-MW-16L 2/2/99	SC-MW-17L 2/2/99	SC-MW-17L 2/2/99
					DILUTED SAMPLE
Benzo(a)pyrene	0.003		< 50	< 10	< 1000
2,4-Dinitrophenol	10		< 250	< 50	< 5000
Dibenz(a,h)anthracene	0.003		< 50	< 10	< 1000
Benzo(a)anthracene	0.03		< 50	< 10	< 1000
4-Chloro-3-methylphenol			< 50	< 10	< 1000
Hexachloroethane	0.7		< 50	< 10	< 1000
Hexachlorocyclopentadiene	50		< 50	< 10	< 1000
Isophorone	100		< 50	< 10	< 1000
Acenaphthene	400		< 50	< 10	< 1000
Diethylphthalate	5000		< 50	< 10	< 1000
Di-n-butylphthalate	900		< 50	< 10	< 1000
Phenanthrene			< 50	< 10	< 1000
Butyl benzyl phthalate	100		< 50	< 10	< 1000
N-Nitrosodiphenylamine	7		< 50	< 10	< 1000
Fluorene	300		< 50	< 10	< 1000
Carbazole			< 50	< 10	< 1000
Hexachlorobutadiene	1		< 50	< 10	< 1000
Pentachlorophenol	0.3		< 250	< 50	< 5000
2,4,6-Trichlorophenol	3		< 50	< 10	< 1000
2-Nitroaniline			< 250	< 50	< 5000
2-Nitrophenol			< 50	< 10	< 1000
Naphthalene			6 J	12	< 1000
2-Methylnaphthalene			< 50	< 10	< 1000
2-Chloronaphthalene			< 50	< 10	< 1000
3,3'-Dichlorobenzidine	0.08		< 50	< 10	< 1000
2-Methylphenol			< 50	< 10	< 1000
1,2-Dichlorobenzene	600		330	[3800] E	[12000] D
2-Chlorophenol	40		< 50	25	< 1000
2,4,5-Trichlorophenol	700		< 250	< 50	< 5000
Nitrobenzene	3		< 50	< 10	< 1000
3-Nitroaniline			< 250	< 50	< 5000
4-Nitroaniline			< 250	< 50	< 5000
4-Nitrophenol			< 250	< 50	< 5000
4-Bromophenyl phenyl ether			< 50	< 10	< 1000
2,4-Dimethylphenol	100		< 50	< 10	< 1000
4-Methylphenol			< 50	< 10	< 1000
1,4-Dichlorobenzene	75		[540]	[3500] E	[11000] D
4-Chloroaniline			< 50	< 10	< 1000
Phenol	4000		< 50	< 10	< 1000
Bis(2-chloroethyl)ether	0.03		< 50	< 10	< 1000
Bis(2-chloroethoxy) methane			< 50	< 10	< 1000
Bis(2-ethylhexyl)phthalate	3		< 50	< 10	< 1000
Di-n-octylphthalate	100		< 50	< 10	< 1000
Hexachlorobenzene	0.02		< 50	< 10	< 1000
Anthracene	2000		< 50	< 10	< 1000
1,2,4-Trichlorobenzene	9		< 50	[17]	< 1000
2,4-Dichlorophenol	20		< 50	6 J	< 1000
2,4-Dinitrotoluene	0.05		< 50	< 10	< 1000
Pyrene	200		< 50	< 10	< 1000

TABLE 3-3

GROUNDWATER ANALYTICAL RESULTS  
STANDARD CHLORINE CHEMICAL COMPANY  
KEARNY, NEW JERSEY

CONSTITUENT: (Units in ug/l)	NEW JERSEY CLASS II-A GROUNDWATER QUALITY CRITERIA	SITE: DATE:	SC-MW-16L 2/2/99	SC-MW-17L 2/2/99	SC-MW-17L 2/2/99  DILUTED SAMPLE
Dimethylphthalate	7000		< 50	< 10	< 1000
Dibenzofuran			< 50	< 10	< 1000
Benzo(g,h,i)perylene			< 50	< 10	< 1000
Indeno(1,2,3-cd)pyrene	0.03		< 50	< 10	< 1000
Benzo(b)fluoranthene	0.03		< 50	< 10	< 1000
Fluoranthene	300		< 50	< 10	< 1000
Benzo(k)fluoranthene	0.03		< 50	< 10	< 1000
Acenaphthylene			< 50	< 10	< 1000
Chrysene	0.03		< 50	< 10	< 1000
4,6-Dinitro-2-methylphenol			< 250	< 50	< 5000
1,3-Dichlorobenzene	600		460	[4100] E	[7400] D
2,6-Dinitrotoluene			< 50	< 10	< 1000
N-Nitrosodi-n-propylamine	0.005		< 50	< 10	< 1000
4-Chlorophenyl phenyl ether			< 50	< 10	< 1000
2,2'-oxybis(1-chloropropane)			< 50	< 10	< 1000

[ ] - Indicates sample concentration greater than New Jersey Class II-A Groundwater Quality Criteria.

J - Estimated concentration less than the method detection limit.

D - Sample concentration determined by analysis of diluted sample.

E - Estimated minimum value, concentration greater than instrument calibration range.

TABLE 3-4

POTENTIOMETRIC SURFACE MEASUREMENTS  
STANDARD CHLORINE CHEMICAL COMPANY  
KEARNY, NEW JERSEY

DATE	MONITORING WELL	MEASURING POINT ELEVATION (ft-msl)	DEPTH TO GROUND WATER (FT)	POTENTIOMETRIC SURFACE ELEVATION (ft-msl)
2/2/99	MW-1L	8.54	5.1	3.44
2/2/99	MW-2L	7.36	4.06	3.3
2/2/99	MW-3L	5.29	2.1	3.19
2/2/99	MW-4L	7.28	4.34	2.94
2/2/99	MW-5L	6.14	2.65	3.49
2/2/99	MW-6L	6.82	3.56	3.26
2/2/99	MW-7L	6.9	3.26	3.64
2/2/99	MW-8L	8.58	6.59	1.99
2/2/99	MW-9L	10.09	8.55	1.54
2/2/99	MW-10L	8.12	5.69	2.43
2/2/99	MW-11L	7.88	4.18	3.7
2/2/99	MW-11U	7.83	3.16	4.67
2/2/99	MW-12L	6.99	3.65	3.34
2/2/99	MW-12U	8.33	4.19	4.14
2/2/99	MW-13L	11.61	8.92	2.69
2/2/99	MW-13U	11.26	6.59	4.67
2/2/99	MW-14L	7.99	5.37	2.62
2/2/99	MW-14U	8.89	3.79	5.1
2/2/99	MW-15L	6.36	3.21	3.15
2/2/99	MW-15U	6.44	2.72	3.72
2/2/99	MW-16L	7.82	4.32	3.5
2/2/99	MW-17L	3.87	0.89	2.98
2/2/99	MW-107	4.24	0.54	3.7
2/2/99	MW-119	4.2	0	4.2
2/2/99	PZ-2U	7.6	5.2	2.4
2/2/99	PZ-4U	7.2	3.75	3.45
2/2/99	PZ-5U	10.92	7.98	2.94

Elevations are in feet above mean sea level referenced to the North American Vertical Datum of 1988.

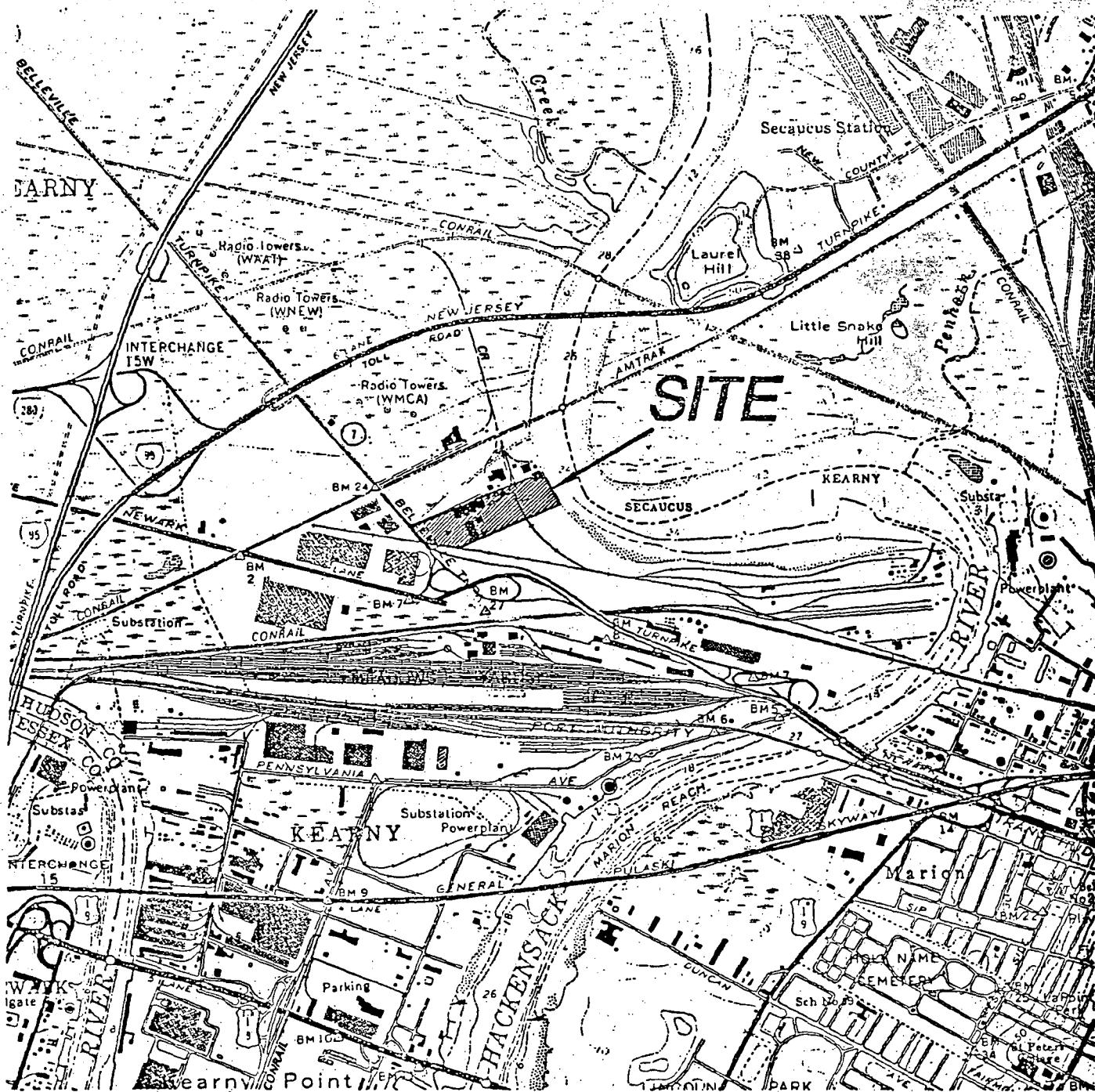


April 1999

*Supplemental Remedial Investigation Report  
Standard Chlorine Chemical Company  
Kearny, New Jersey*

---

**FIGURES**



NEW JERSEY



QUADRANGLE LOCATION

# STANDARD CHLORINE CHEMICAL COMPANY KEARNY, NEW JERSEY

DRAWN: MEL DATE: 02/26/89  
CHKD: TEJ DATE: 02/26/89  
APPD: JSZ DATE: 02/26/89  
SCALE: 1"=2000'

**KEY** ENVIRONMENTAL  
INCORPORATED

REMEDIAL INVESTIGATION  
STANDARD CHLORINE CHEMICAL COMPANY SITE  
KEARNY, NEW JERSEY

REFERENCE: USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLES  
OF JERSEY CITY, AND WEEHAWKEN, NEW JERSEY

PREPARED FOR:  
ITC / EDC

ISSUE DATE:

ROSSLYN FARMS  
INDUSTRIAL PARK  
1200 ARCH ST., SUITE 200  
CARNEGIE, PA 15106

SITE LOCATION MAP

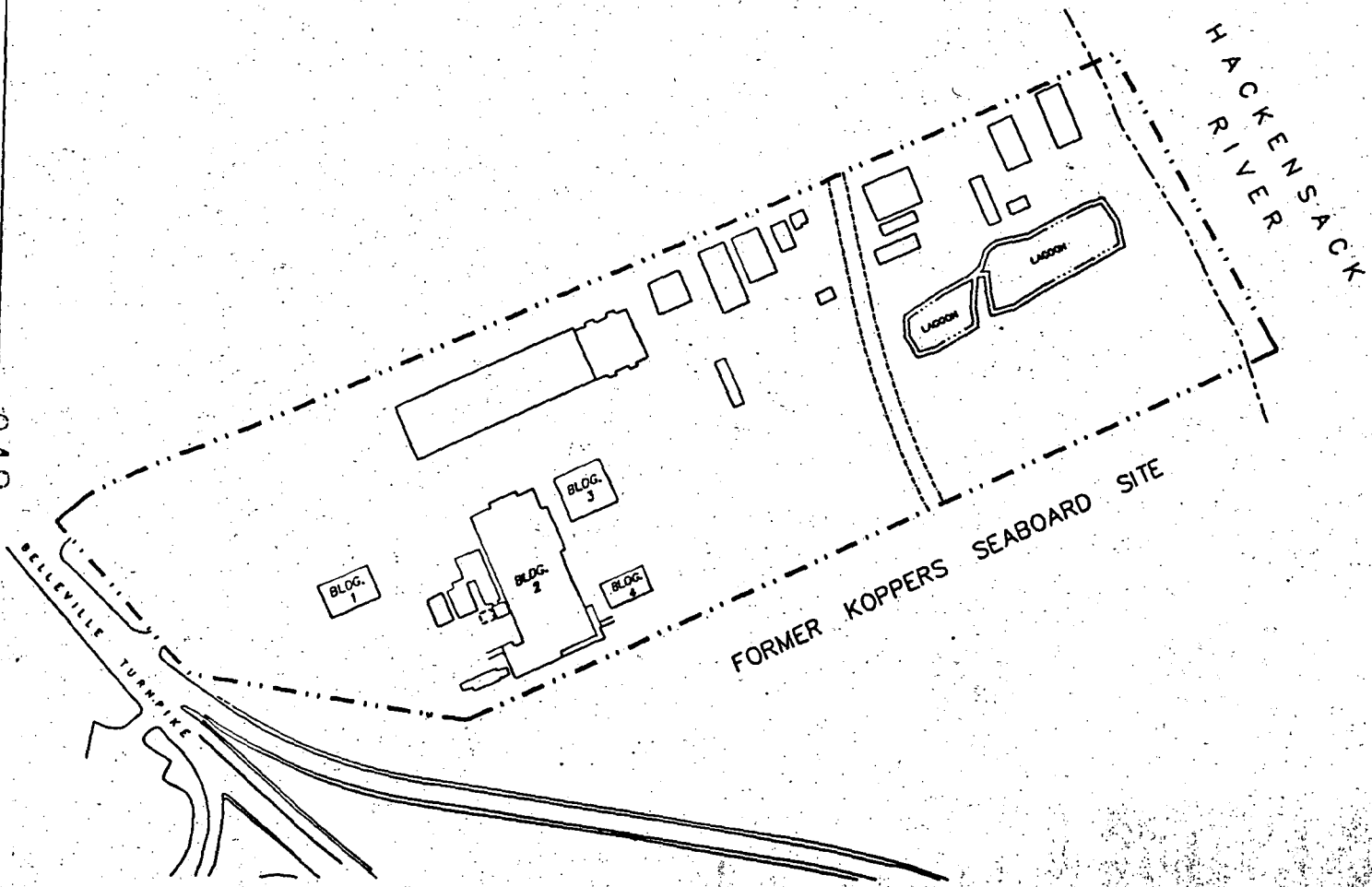
DRAWING NUMBER  
58640

FIGURE 1-1

6740

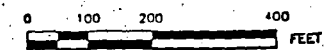
DATE: 12/15/98 BY: [illegible]

NO. 1



**LEGEND:**

- SITE BOUNDARY
- STRUCTURES/BUILDINGS
- == RIGHT OF WAY



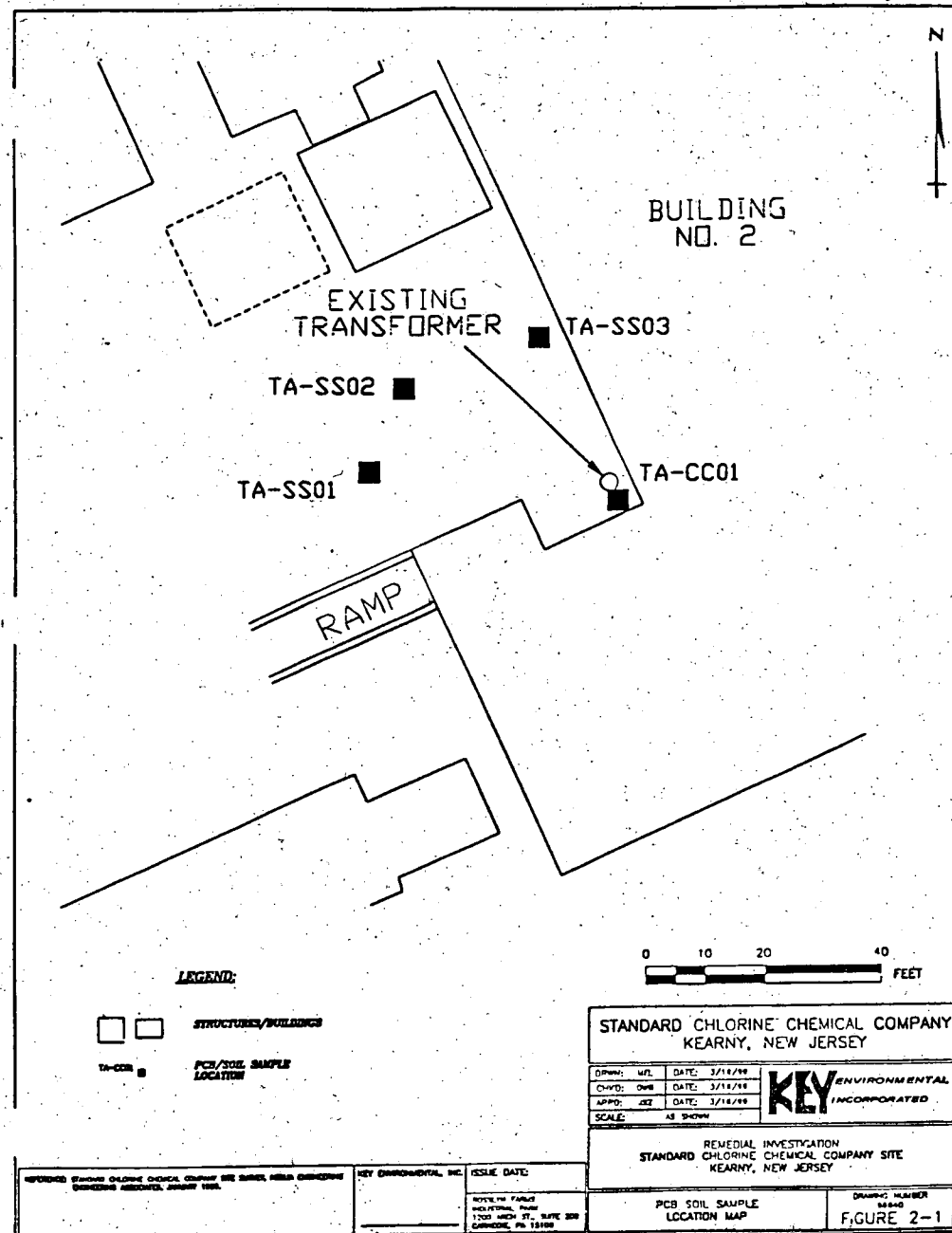
STANDARD CHLORINE CHEMICAL COMPANY KEARNY, NEW JERSEY	
OWNER: [illegible]	DATE: 12/15/98
OWNER: [illegible]	DATE: 12/15/98
APPRO: [illegible]	DATE: 12/15/98
SCALE: AS SHOWN	
<b>KEY</b> ENVIRONMENTAL INCORPORATED	
REVEAL INVESTIGATION STANDARD CHLORINE CHEMICAL COMPANY SITE KEARNY, NEW JERSEY	
SITE MAP	FIGURE 1-2

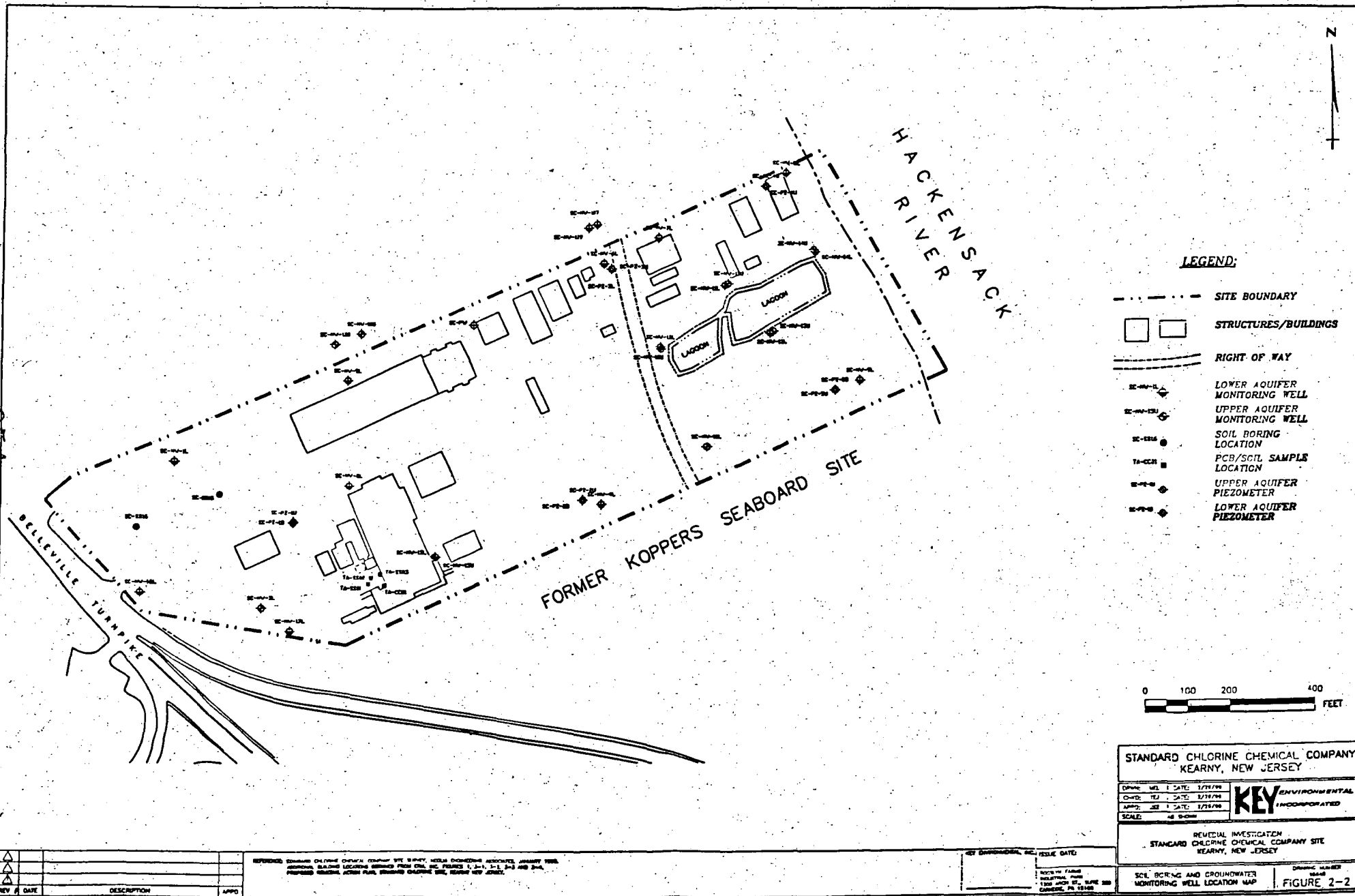
NOTES: [illegible text]

ISSUE DATE:	
REVISION:	

NO.	DESCRIPTION	APPRO.
1		
2		
3		
4		

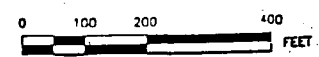
050





**LEGEND:**

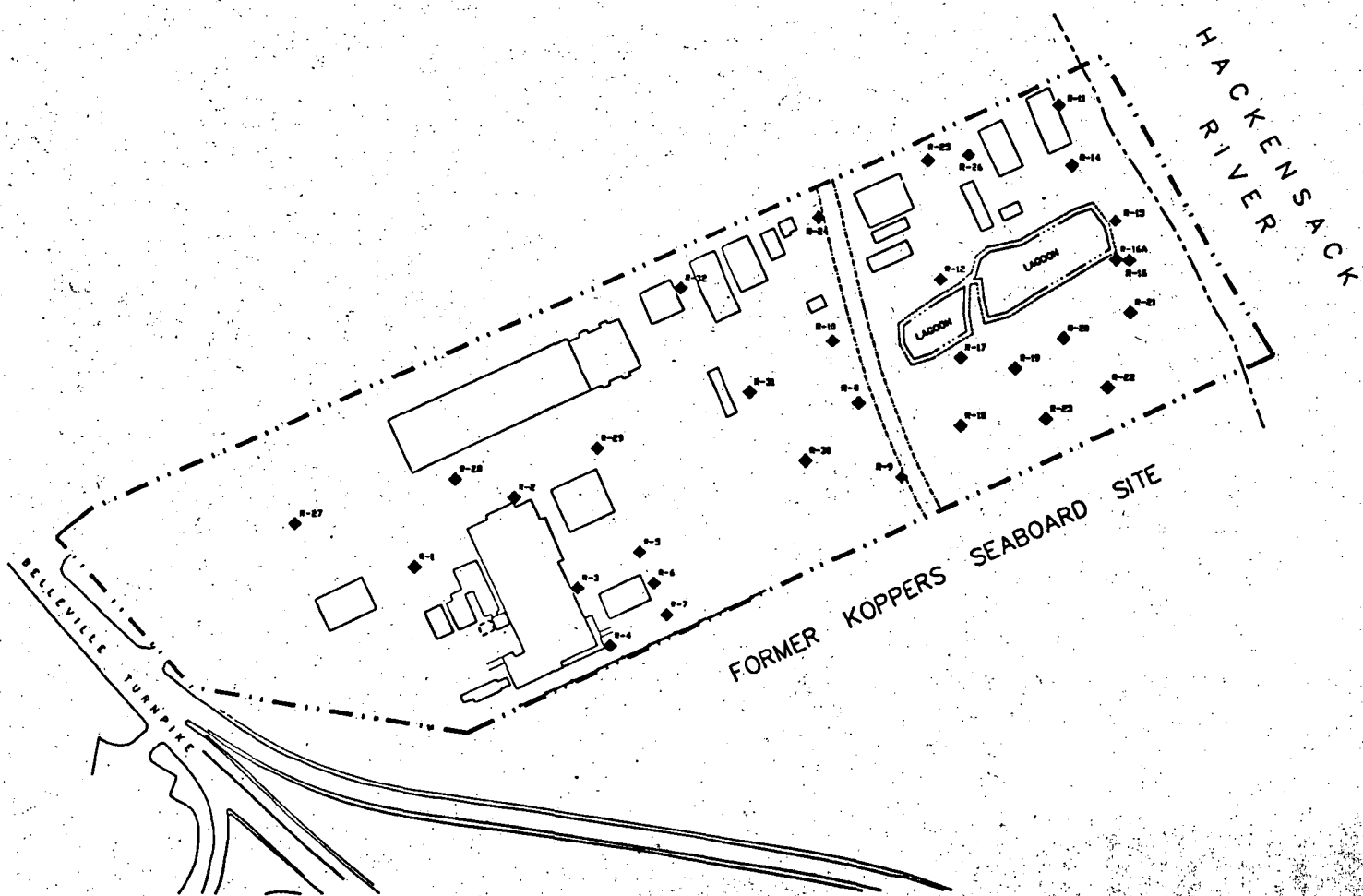
- SITE BOUNDARY
- STRUCTURES/BUILDINGS
- RIGHT OF WAY
- EC-100-1 LOWER AQUIFER MONITORING WELL
- EC-100-2 UPPER AQUIFER MONITORING WELL
- EC-100-3 SOIL BORING LOCATION
- TA-100-1 PCB/SOIL SAMPLE LOCATION
- EC-100-4 UPPER AQUIFER PIEZOMETER
- EC-100-5 LOWER AQUIFER PIEZOMETER



STANDARD CHLORINE CHEMICAL COMPANY KEARNY, NEW JERSEY	
DRING: WEL 1 DATE: 1/19/79	<b>KEY</b> ENVIRONMENTAL INCORPORATED
CHRD: TEL 1 DATE: 1/19/79	
APPD: JED 1 DATE: 1/19/79	
SCALE: AS SHOWN	
REVEAL INVESTIGATION STANDARD CHLORINE CHEMICAL COMPANY SITE KEARNY, NEW JERSEY	
SOIL BORING AND GROUNDWATER MONITORING WELL LOCATION MAP	
DRAWING NUMBER FIGURE 2-2	

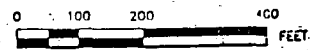
REFERENCE: STANDARD CHLORINE CHEMICAL COMPANY SITE 100-1, 100-2, 100-3, 100-4, 100-5, 100-6, 100-7, 100-8, 100-9, 100-10, 100-11, 100-12, 100-13, 100-14, 100-15, 100-16, 100-17, 100-18, 100-19, 100-20, 100-21, 100-22, 100-23, 100-24, 100-25, 100-26, 100-27, 100-28, 100-29, 100-30, 100-31, 100-32, 100-33, 100-34, 100-35, 100-36, 100-37, 100-38, 100-39, 100-40, 100-41, 100-42, 100-43, 100-44, 100-45, 100-46, 100-47, 100-48, 100-49, 100-50, 100-51, 100-52, 100-53, 100-54, 100-55, 100-56, 100-57, 100-58, 100-59, 100-60, 100-61, 100-62, 100-63, 100-64, 100-65, 100-66, 100-67, 100-68, 100-69, 100-70, 100-71, 100-72, 100-73, 100-74, 100-75, 100-76, 100-77, 100-78, 100-79, 100-80, 100-81, 100-82, 100-83, 100-84, 100-85, 100-86, 100-87, 100-88, 100-89, 100-90, 100-91, 100-92, 100-93, 100-94, 100-95, 100-96, 100-97, 100-98, 100-99, 100-100.

REV	DATE	DESCRIPTION	APPRO
1			
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**LEGEND:**

- SITE BOUNDARY
- STRUCTURES/BUILDINGS
- RIGHT OF WAY
- ◆ R-27 ROST BORING LOCATION



STANDARD CHLORINE CHEMICAL COMPANY KEARNY, NEW JERSEY			
DRAWN: MCL	DATE: 1/24/78	<b>KEY</b> ENVIRONMENTAL INCORPORATED	
CH-ED: TLI	DATE: 1/11/78		
APP'D: JES	DATE: 1/19/78		
SCALE: AS SHOWN			
REMEDIAL INVESTIGATION STANDARD CHLORINE CHEMICAL COMPANY SITE KEARNY, NEW JERSEY			
ROST BORING LOCATION MAP		DRAWING NUMBER 8848 <b>FIGURE 2-3</b>	

APPROVED: STANDARD CHLORINE CHEMICAL COMPANY SITE, KEARNY, NEW JERSEY, JANUARY 1978.  
APPROVED: BASELINE LOCATION MAP, KEARNY, NEW JERSEY, JANUARY 1978.  
APPROVED: REVISIONS: R-1, R-2, R-3, R-4, R-5, R-6, R-7, R-8, R-9, R-10, R-11, R-12, R-13, R-14, R-15, R-16, R-17, R-18, R-19, R-20, R-21, R-22, R-23, R-24, R-25, R-26, R-27, R-28.

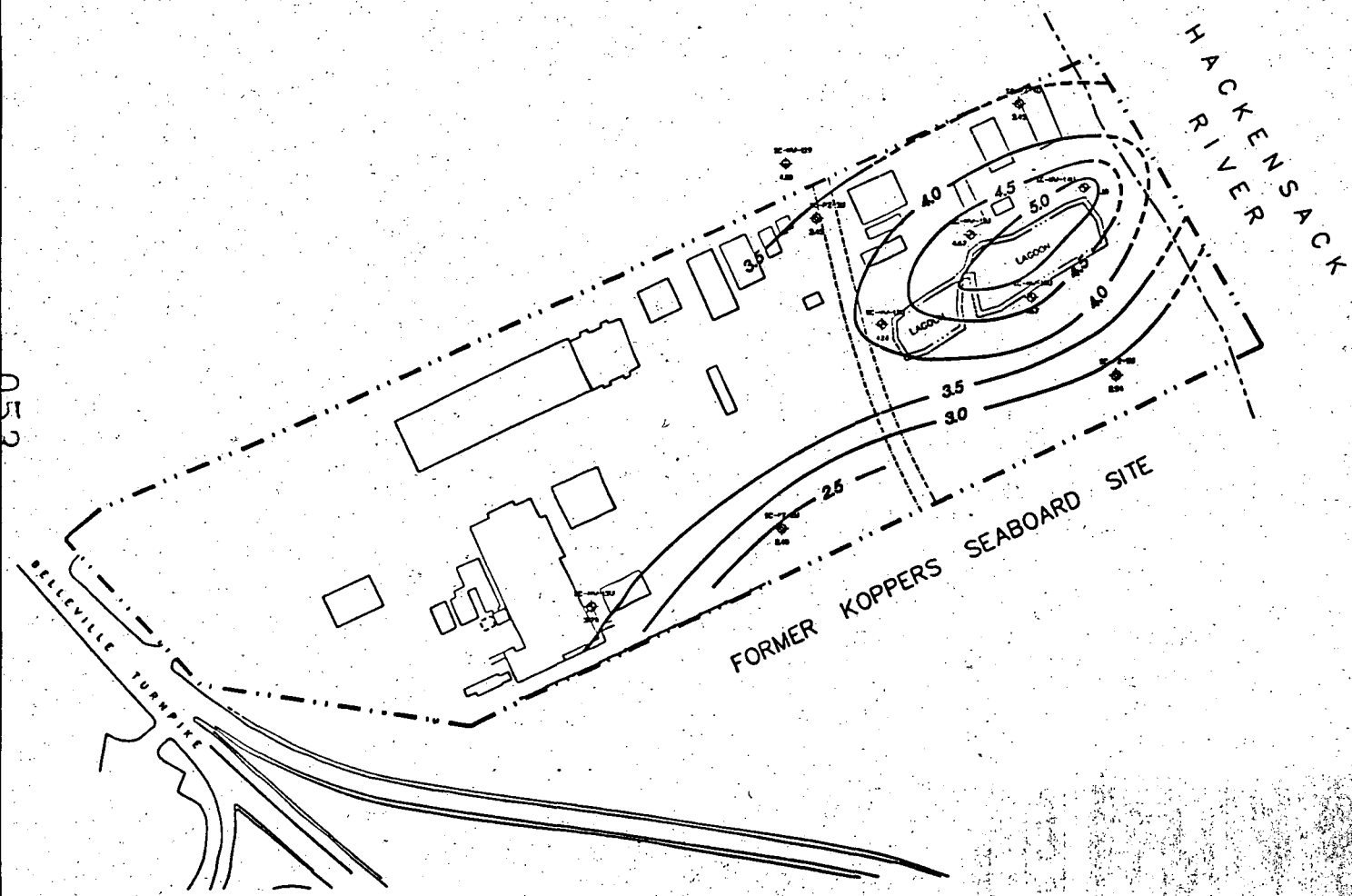
REV	DATE	DESCRIPTION	APPROVED

KEY: ENVIRONMENTAL  
INCORPORATED  
ISSUE DATE:  
WORK IN PROGRESS  
POLYMERIZATION UNIT  
1000 GALLON DR. DATE: 1/19/78  
CHLORINE, NJ 07030

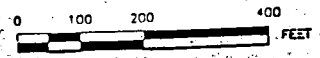
053

REV	DATE	DESCRIPTION	APPROVED
1			
2			
3			

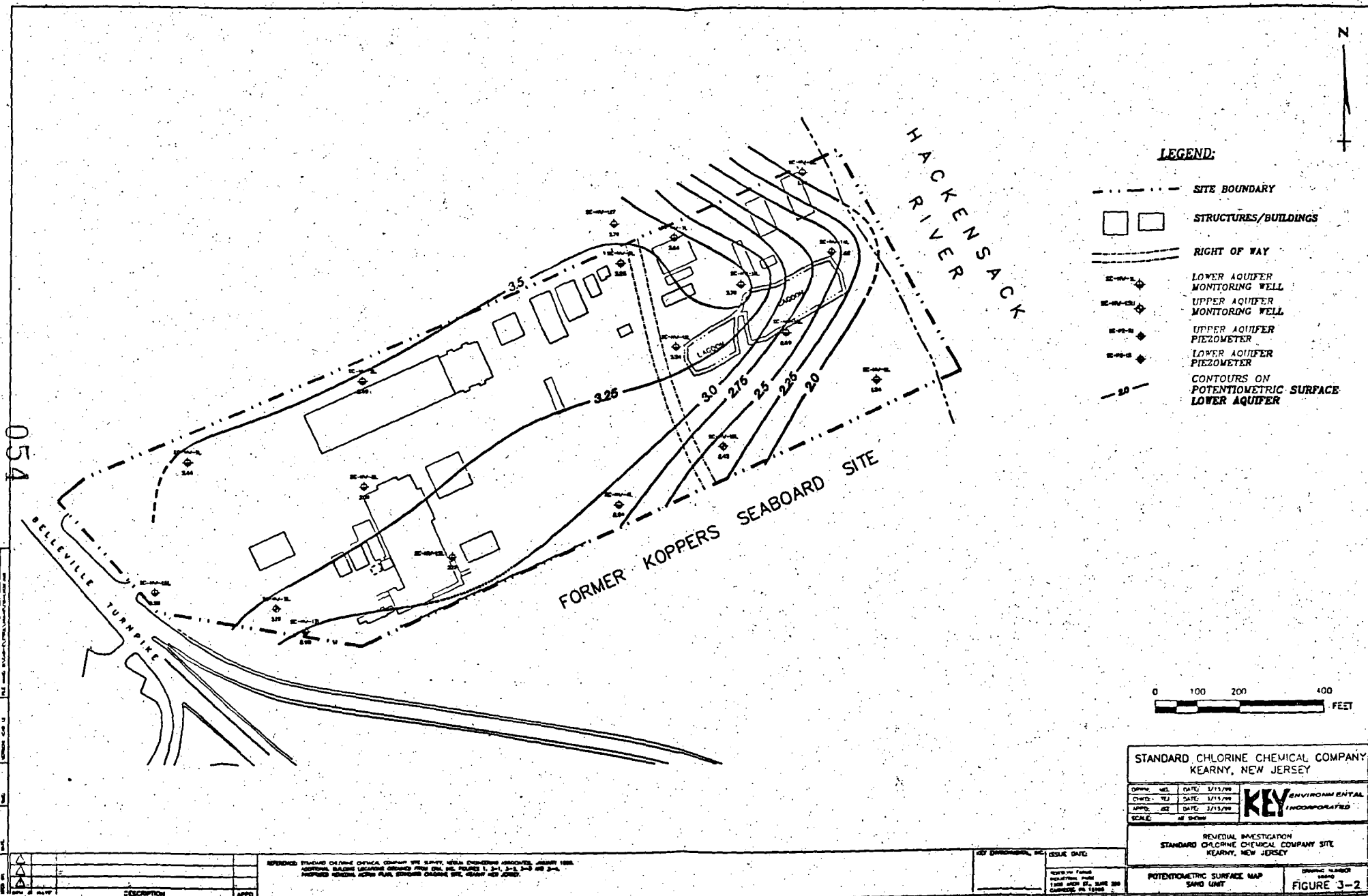
REVISIONS: STANDARD CHLORINE CHEMICAL COMPANY SITE, NEW JERSEY, KEARNY, NEW JERSEY, JANUARY 1988.  
 ADDITIONAL: BUREAU OF ENVIRONMENTAL PROTECTION, NEW JERSEY, DECEMBER 1987, 1-1, 1-2, 1-3 AND 1-4.  
 REVISIONS: BUREAU OF ENVIRONMENTAL PROTECTION, NEW JERSEY, DECEMBER 1987, 1-1, 1-2, 1-3 AND 1-4.

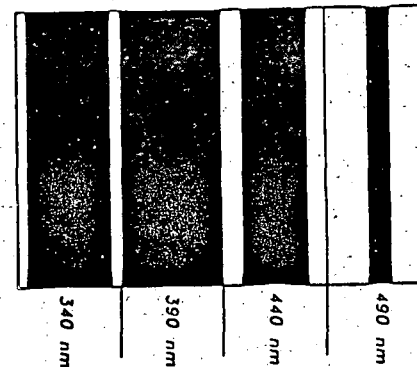


- LEGEND:**
- SITE BOUNDARY
  - STRUCTURES/BUILDINGS
  - - - RIGHT OF WAY
  - ◆ LOWER AQUIFER MONITORING WELL
  - ◆ UPPER AQUIFER MONITORING WELL
  - ◆ UPPER AQUIFER PIEZOMETER
  - ◆ LOWER AQUIFER PIEZOMETER
  - CONTOURS ON POTENTIOMETRIC SURFACE UPPER AQUIFER

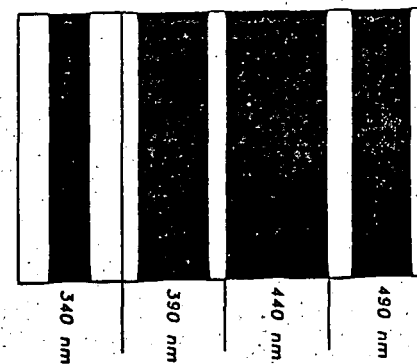


STANDARD CHLORINE CHEMICAL COMPANY KEARNY, NEW JERSEY			
OWNER: MCL	DATE: 3/15/88	<b>KEY</b> ENVIRONMENTAL INCORPORATED	DRAWING NUMBER: 3-1
CHWD: TJ	DATE: 3/15/88		
APPRO: JZ	DATE: 3/15/88		
SCALE: AS SHOWN		REVEAL INVESTIGATION STANDARD CHLORINE CHEMICAL COMPANY SITE KEARNY, NEW JERSEY	
POTENTIOMETRIC SURFACE MAP FILL UNIT		FIGURE 3-1	





TYPE #1 NAPL SIGNATURE



TYPE #2 NAPL SIGNATURE

NOTES: PRODUCT IDENTIFICATION BASED ON RELATIVE FLUORESCENCE INTENSITY  
AS INDICATED BY THE BANDWIDTHS.  
nm = NANOMETERS

STANDARD CHLORINE CHEMICAL COMPANY  
KEARNY, NEW JERSEY

DRAWN: MEL	DATE: 03/19/98
CHKD: TEL	DATE: 03/19/98
APPD: JSL	DATE: 03/19/98
SCALE: AS SHOWN	

**KEY** ENVIRONMENTAL  
INCORPORATED

REMEDIAL INVESTIGATION  
STANDARD CHLORINE CHEMICAL COMPANY SITE  
KEARNY, NEW JERSEY

KEY ENVIRONMENTAL, INC. ISSUE DATE:

NOTES TO FIELD:  
HEALTHY FARM  
1000 LUNCH ST., SUITE 200  
CAMDEN, NJ 08100

TYPICAL MULTI-WAVELENGTH (MWL)  
SIGNATURES

DRAWING NUMBER

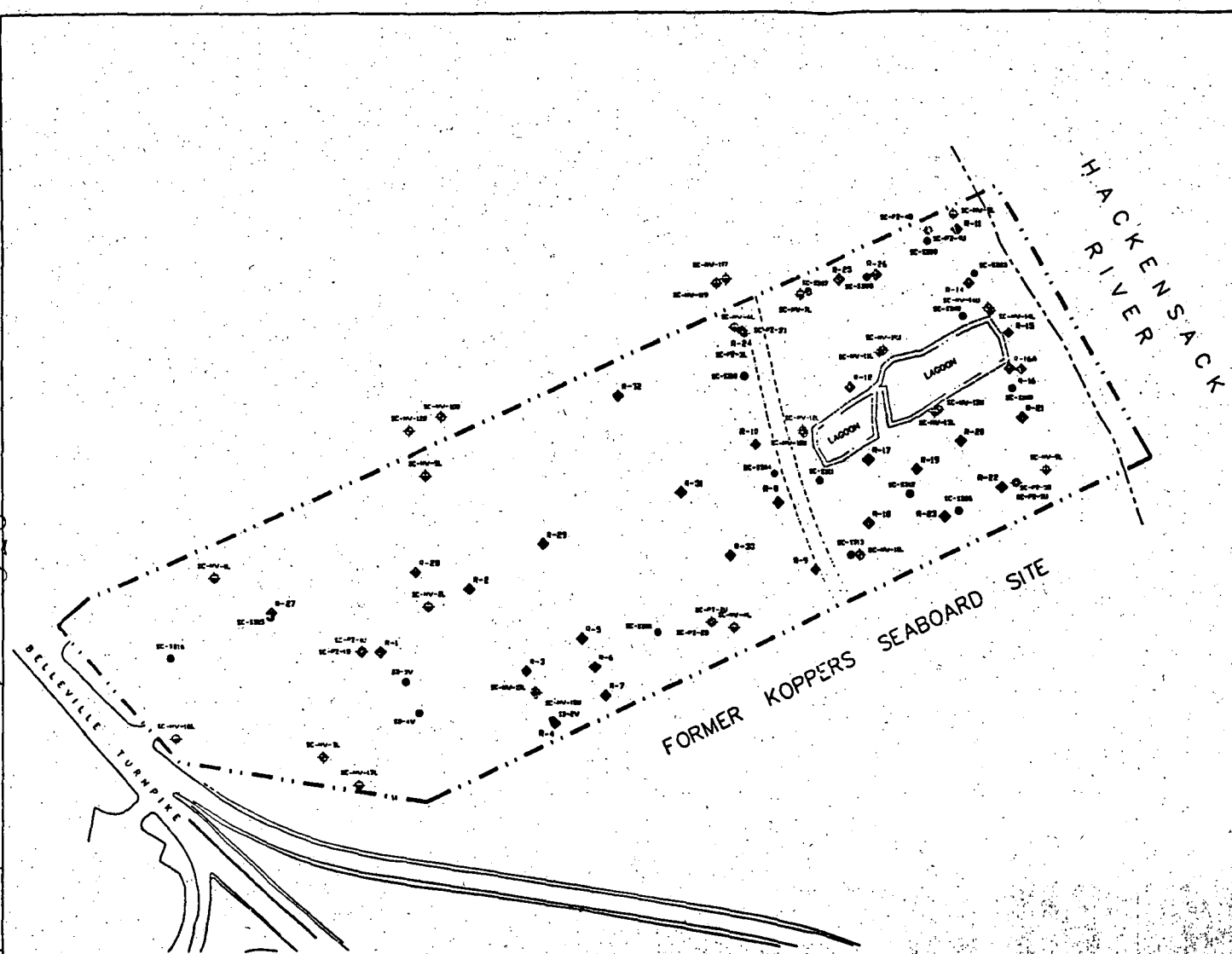
18840

FIGURE 3-3

DEL. ENVIRONMENTAL/REMEDIAL/KEY INC.

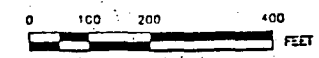
055

950



**LEGEND:**

- SITE BOUNDARY
- STRUCTURES/BUILDINGS
- RIGHT OF WAY
- MW-1 through MW-27: LOWER AQUIFER MONITORING WELL
- MW-1 through MW-27: UPPER AQUIFER MONITORING WELL
- SB-1 through SB-27: SOIL BORING LOCATION
- SB-1 through SB-27: PCB/SOIL SAMPLE LOCATION
- P-1 through P-27: UPPER AQUIFER PIEZOMETER
- P-1 through P-27: LOWER AQUIFER PIEZOMETER
- R-1 through R-27: ROST BORING LOCATION
- DNAPL PRESENCE DETECTED
- DNAPL PRESENCE NOT DETECTED

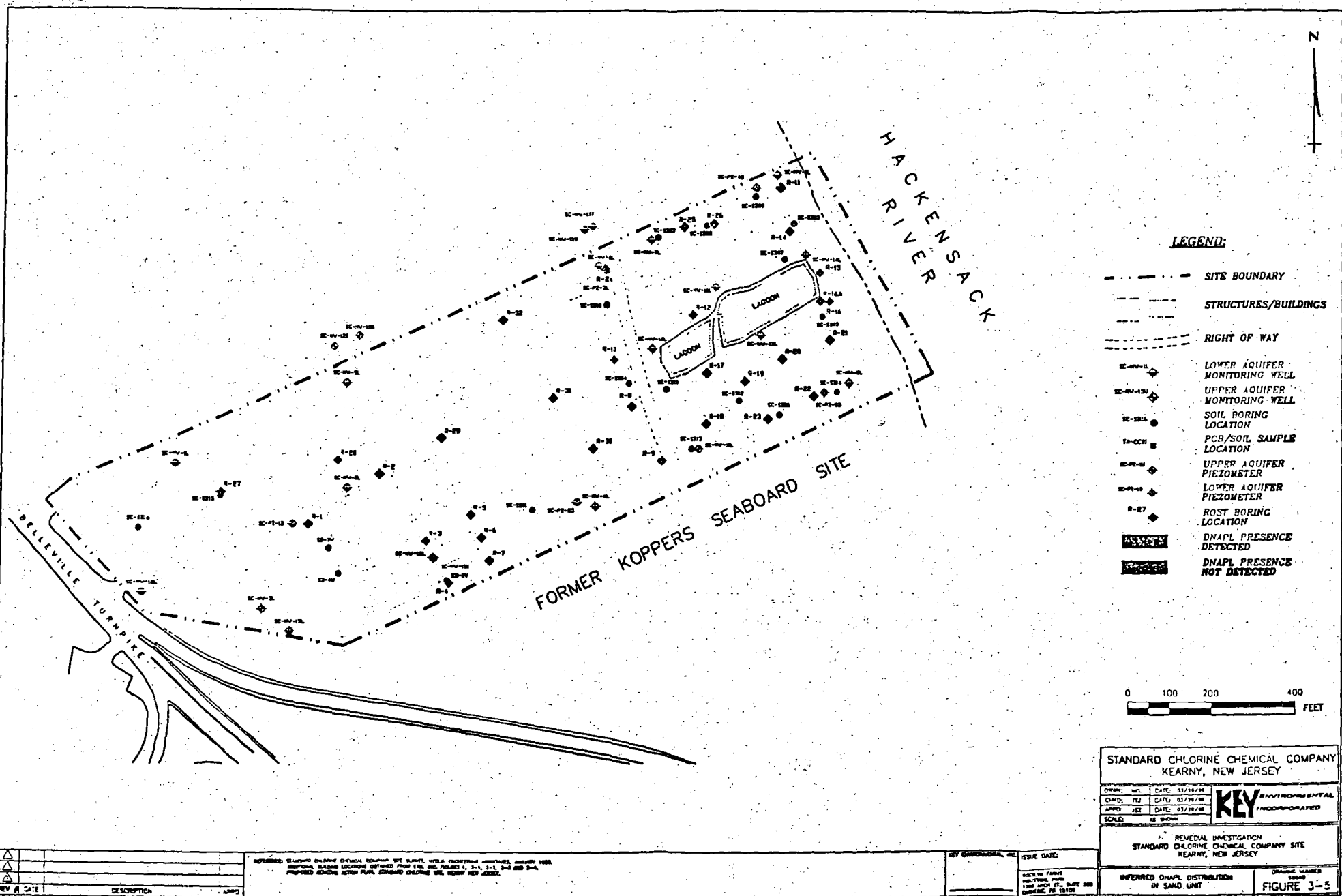


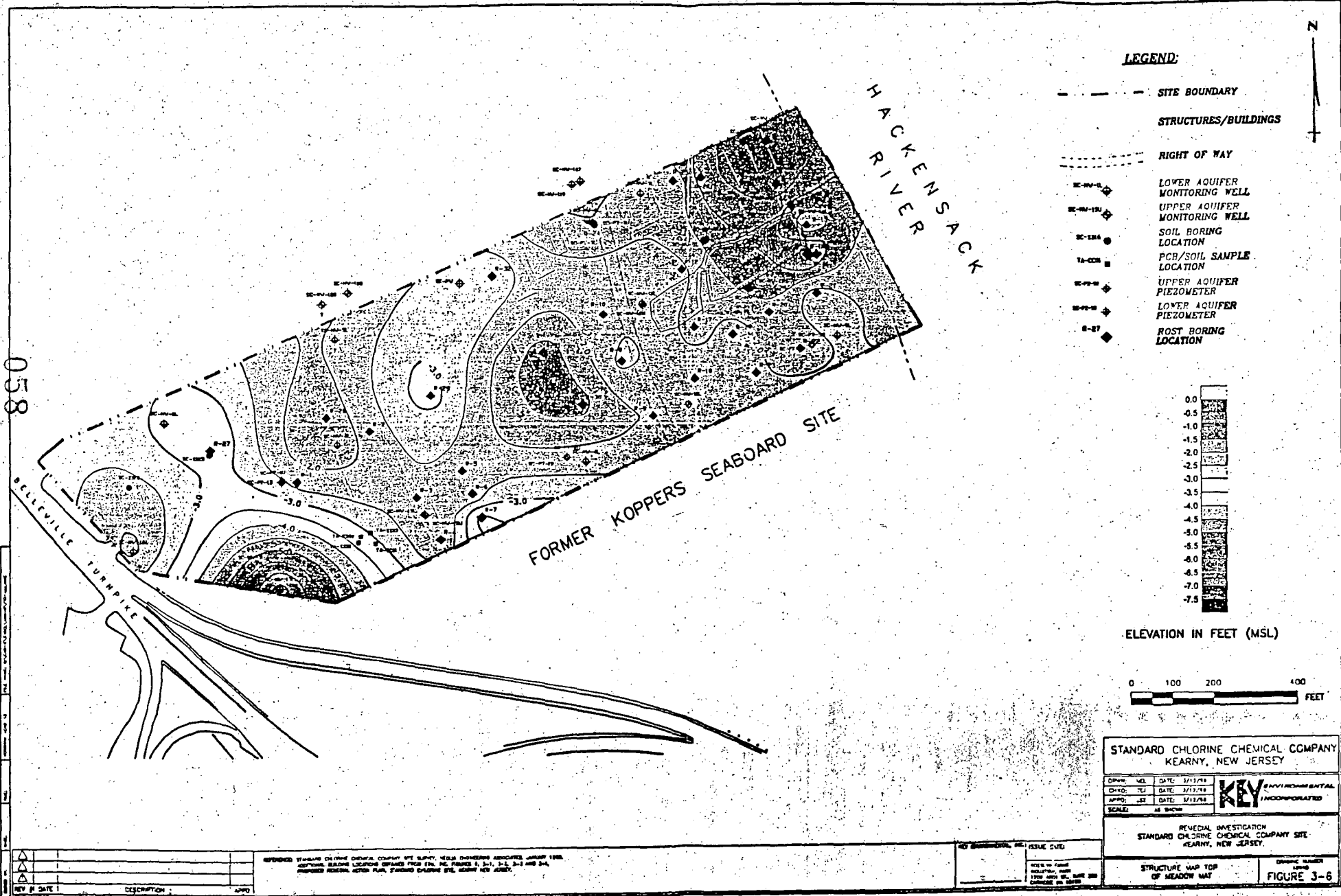
STANDARD CHLORINE CHEMICAL COMPANY KEARNY, NEW JERSEY	
DATE: 12/1/78	DATE: 12/1/78
APPD: 12	DATE: 12/1/78
SCALE: 1" = 100'	
FEDERAL INVESTIGATION STANDARD CHLORINE CHEMICAL COMPANY SITE KEARNY, NEW JERSEY	
INFERRED DNAPL DISTRIBUTION F.L. UNIT	FIGURE 3-1

REPRODUCED STANDARD CHLORINE CHEMICAL COMPANY OF KERNY, NEW JERSEY, JANUARY 1979.  
ADDITIONAL MONITORING LOCATIONS OBTAINED FROM THE NEW JERSEY DEPT. OF ENVIRONMENTAL PROTECTION, DIVISION OF WATER, 1980. MONITORING LOCATIONS 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.

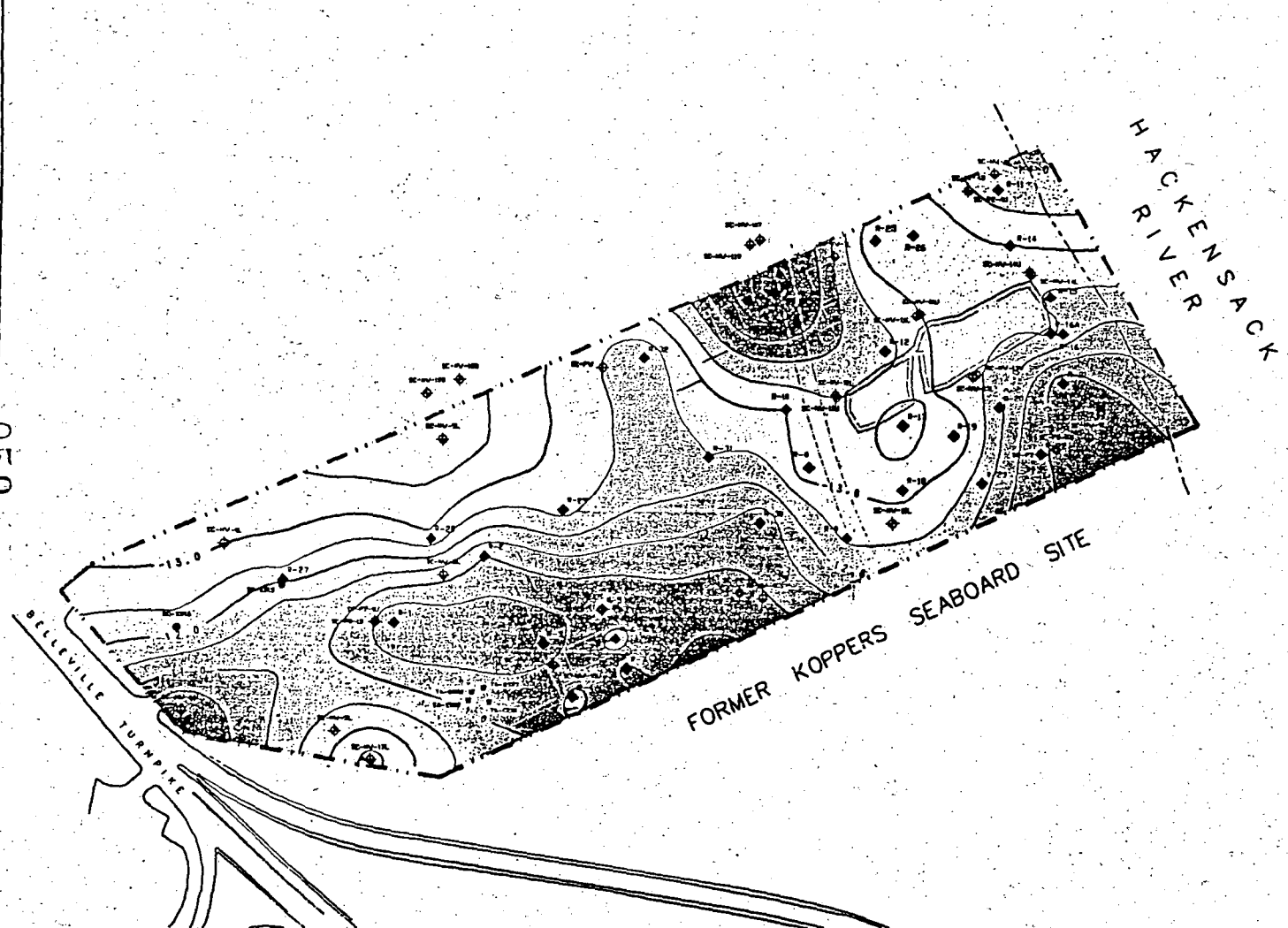
DATE	DESCRIPTION	APPD

057



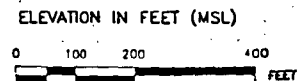
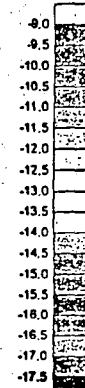


059



**LEGEND:**

- SITE BOUNDARY
- STRUCTURES/BUILDINGS
- RIGHT OF WAY
- SC-100-1 LOWER AQUIFER MONITORING WELL
- SC-100-2 UPPER AQUIFER MONITORING WELL
- SC-100-3 SOIL BORING LOCATION
- SC-100-4 PCB/SOIL SAMPLE LOCATION
- SC-100-5 UPPER AQUIFER PIEZOMETER
- SC-100-6 LOWER AQUIFER PIEZOMETER
- SC-100-7 ROST BORING LOCATION



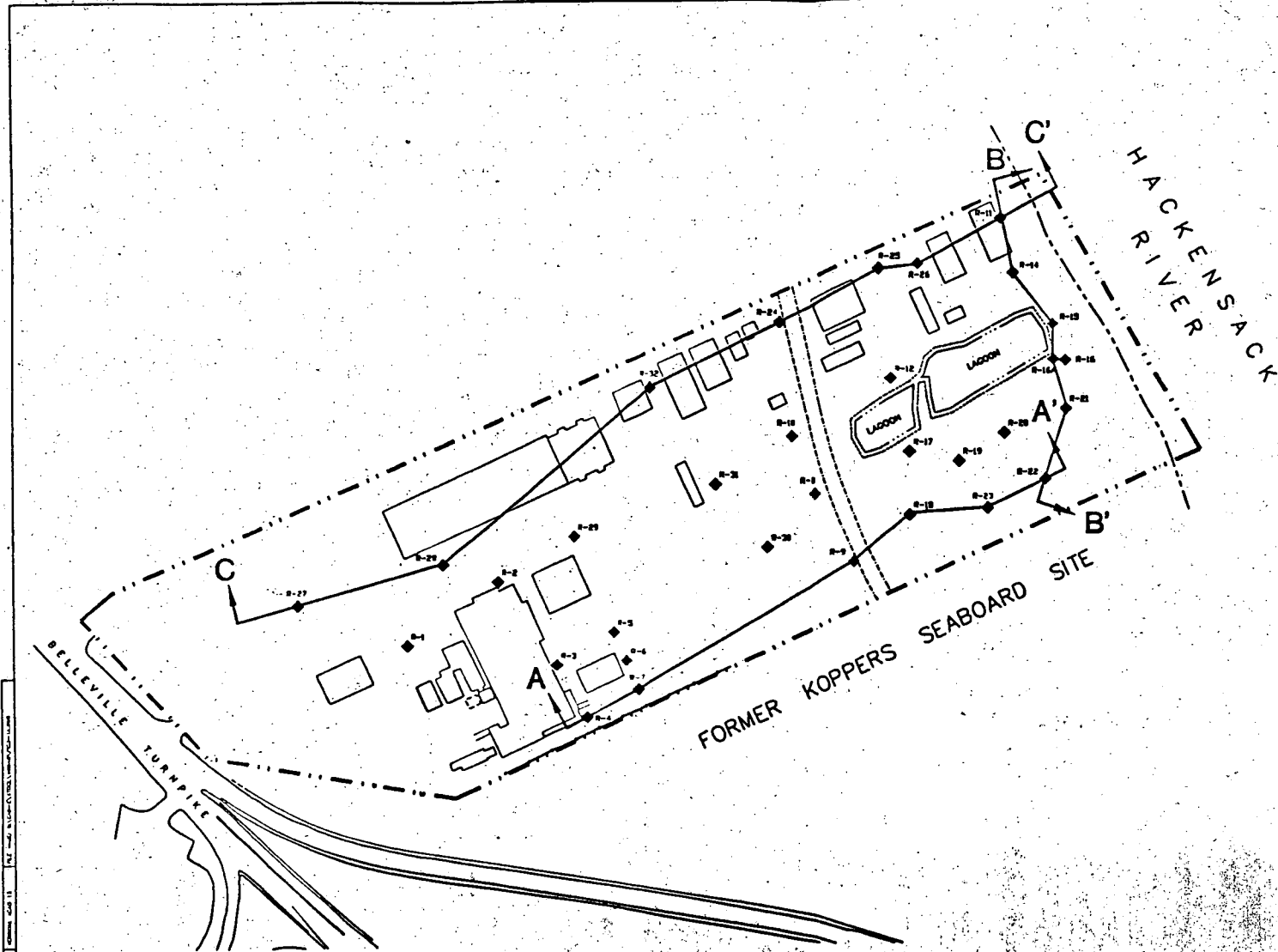
STANDARD CHLORINE CHEMICAL COMPANY KEARNY, NEW JERSEY			
DATE: 12/1/78	DATE: 12/1/78	<b>KEY</b> ENVIRONMENTAL INCORPORATED	REVEAL INVESTIGATION STANDARD CHLORINE CHEMICAL COMPANY SITE KEARNY, NEW JERSEY
DATE: 12/1/78	DATE: 12/1/78		
SCALE: 1" = 100'		STRUCTURE MAP TOP OF VARIED CLAY	
DATE: 12/1/78		FIGURE 3-7	

REV #	DATE	DESCRIPTION	APPRO
1			
2			
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7			
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REFERENCE: STANDARD CHLORINE CHEMICAL COMPANY SPT SURVEY, AREA ENGINEERING ASSOCIATES, JANUARY 1980.  
 MONITORING BOREHOLE LOCATIONS SHOWN FROM 1" = 100' SCALE, SHEETS 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.

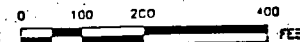
KEY ENVIRONMENTAL, INC.	ISSUE DATE

060



**LEGEND:**

- SITE BOUNDARY
- STRUCTURES/BUILDINGS
- RIGHT OF WAY
- R-27 ◆ ROSETTE BORING LOCATION
- A A' CROSS SECTION LOCATION



STANDARD CHLORINE CHEMICAL COMPANY  
KEARNY, NEW JERSEY

DRYING: 100% DATE: 1/15/79  
CHVD: 75 DATE: 1/15/79  
APPO: 452 DATE: 1/15/79  
SCALE: AS SHOWN

**KEY** ENVIRONMENTAL  
INCORPORATED

REMEDIAL INVESTIGATION  
STANDARD CHLORINE CHEMICAL COMPANY SITE  
KEARNY, NEW JERSEY

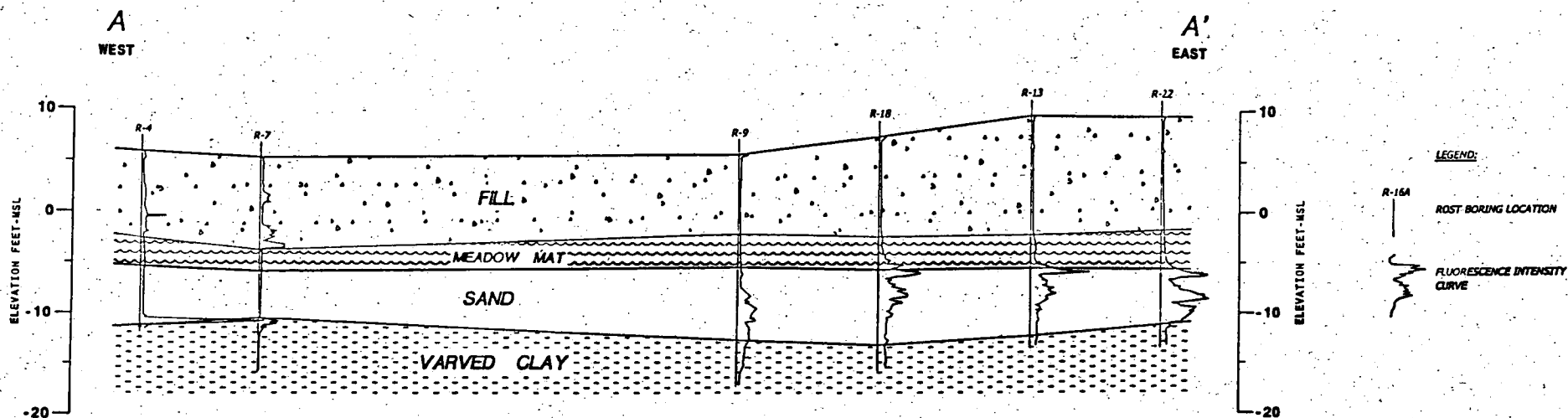
GEOLOGIC CROSS SECTION  
LOCATION MAP

FIGURE 1-A

REV	DATE	DESCRIPTION	APPRO
1			
2			
3			

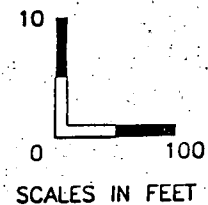
REFERENCE: STANDARD CHLORINE CHEMICAL COMPANY SITE SURVEY, MEDIA MONITORING REPORTS, SUMMARY REPORT, EDITIONS, BOREHOLE LOGS, AND OTHER DATA, PLANNED 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 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061



**LEGEND:**

- R-16A ROST BORING LOCATION
- FLUORESCENCE INTENSITY CURVE



REVISIONS TO THIS DRAWING ARE TO BE MADE BY THE ORIGINAL DESIGNER OR HIS AUTHORIZED REPRESENTATIVE.

REV	DATE	DESCRIPTION	APPROVED

NOTE: LOCATION OF CROSS SECTION INDICATED ON PLANS 3-A.

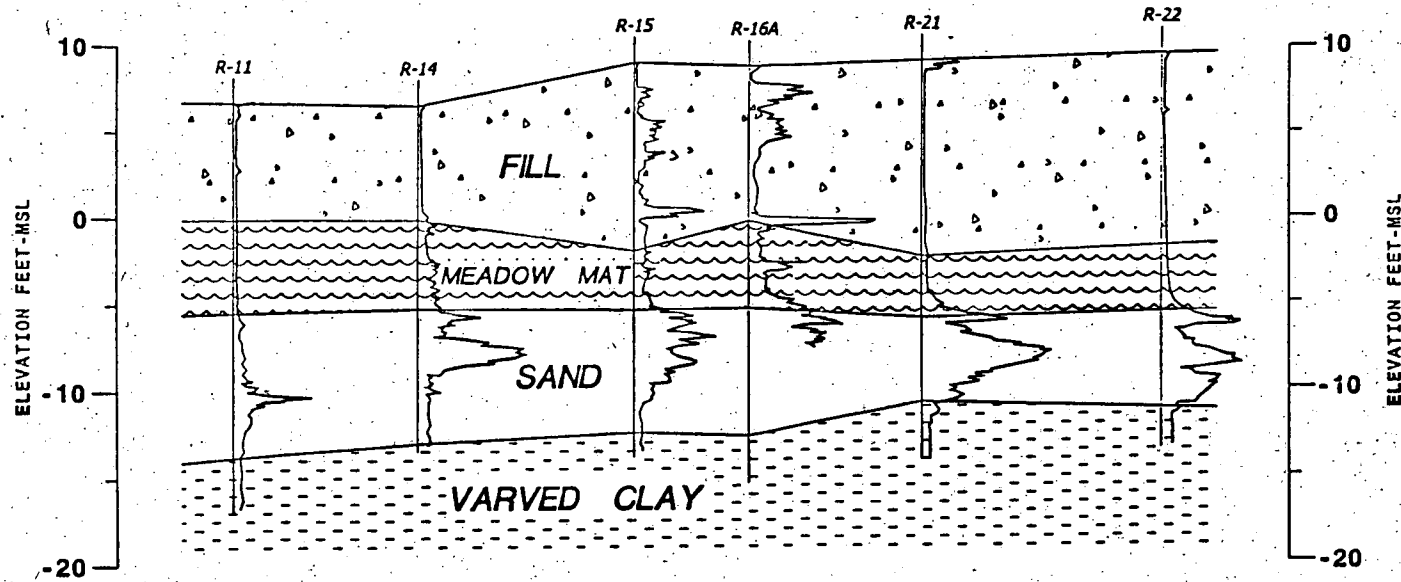
BY	DATE	ISSUE DATE

STANDARD CHLORINE CHEMICAL COMPANY KEARNY, NEW JERSEY			
OWNER: MCL	DATE: 1/11/79	<b>KEY</b> ENVIRONMENTAL INCORPORATED	
CLIENT: TEL	DATE: 1/11/79		
APPRO: MCL	DATE: 1/11/79		
SCALE: AS SHOWN			
REMEDIAL INVESTIGATION STANDARD CHLORINE CHEMICAL COMPANY SITE KEARNY, NEW JERSEY			
CROSS SECTION A-A'			
DRAWING NUMBER CCH 100 1-0A			

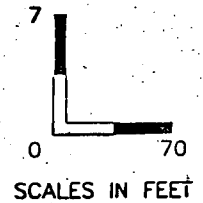
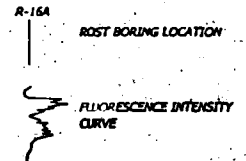
062

B  
NORTH

B'  
SOUTH



LEGEND:



STANDARD CHLORINE CHEMICAL COMPANY  
KEARNY, NEW JERSEY

DRINKING WATER	DATE: 1/11/98
CHLORINE	DATE: 1/11/98
APPROVED	DATE: 1/11/98
SCALE	AS SHOWN

**KEY** ENVIRONMENTAL  
INCORPORATED

REMEDIAL INVESTIGATION  
STANDARD CHLORINE CHEMICAL COMPANY SITE  
KEARNY, NEW JERSEY

CROSS SECTION B-B'

DATE: 1/11/98  
BY: J. L. AD

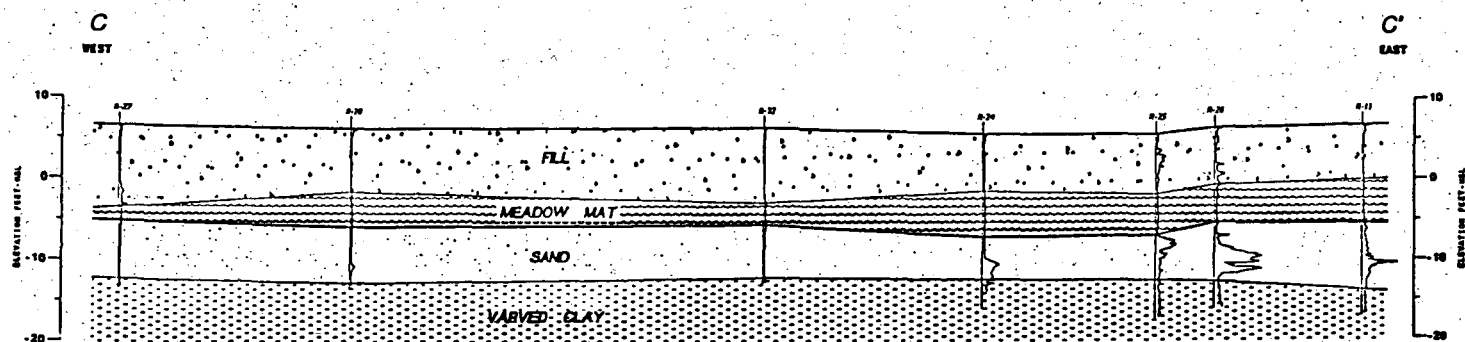
REV	DATE	DESCRIPTION	APPROVED
1			
2			
3			

FIELD LOCATION OF CROSS SECTION ILLUSTRATED ON PAGE 3-1

KEY DRINKING WATER, DATE: 1/11/98

REVISION: Final  
REVISION: Final  
1000 1000 1000 1000  
1000 1000 1000 1000

063



LEGEND:

- R-16A  
ROST BORING LOCATION
- FLUORESCENCE INTENSITY CURVE



SCALES IN FEET

STANDARD CHLORINE CHEMICAL COMPANY  
KEARNY, NEW JERSEY

Drawn: WEL	DATE: 3/13/79
Checked: TLI	DATE: 3/13/79
Scale: AS	DATE: 3/13/79
SCALE: 1/8" = 1'-0"	

**KEY** ENVIRONMENTAL  
INCORPORATED

REMEDIAL INVESTIGATION  
STANDARD CHLORINE CHEMICAL COMPANY SITE  
KEARNY, NEW JERSEY

CROSS SECTION C-C'

FIGURE 3-9C

SEE LOCATIONS OF OTHER SECTIONS SHOWN ON FIGURE 3-4.

REV	DATE	DESCRIPTION	APPROV
1			
2			
3			

KEY: 1/8" = 1'-0"  
1/4" = 2'-0"  
1/2" = 4'-0"  
3/4" = 6'-0"  
1" = 8'-0"

April 1999

*Supplemental Remedial Investigation Report  
Standard Chlorine Chemical Company  
Kearny, New Jersey*

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## APPENDIX A

### BORING LOGS AND MONITORING WELL CONSTRUCTION DIAGRAMS



Site ID: SC-MW-16L	Location: Standard Chlorine Chemical Co.
Contractor: JCA Associates	Ground Surface Elevation (ft-msl): 8.00'
Consulting Firm: Key Environmental	Datum: Mean Sea Level
Logged By: TEJ	Date(s): 01/13/99 - 01/18/99

Type: Well	Riser Casing: type: PVC	dia: 2.00in	fm: -0.2'	to: 13.20'
Drilling Method: Hollow Stem Auger & Fluid Rotary	Screens: type: Slotted	size: 0.010in dia: 2.00in	fm: 13.17'	to: 18.17'
Well Construction Materials: type: Bentonite Grout type: Bentonite Pellets type: Sand Filter type: Bentonite Pellets	fm: 0.00' fm: 10.40' fm: 12.33' fm: 18.17'	to: 10.40' to: 12.33' to: 18.17' to: 19.00'	SUPPLEMENTAL REMEDIAL INVESTIGATION STANDARD CHLORINE CHEMICAL CO. KEARNY, NEW JERSEY	

Elevation (ft-msl)	Depth (ft-bgs)	Recovery	Sample No.	Blow Count	USCS Code	PIB (ppm)	Graphic Log	Material Description	Well Construction
									MP. EL. 7.82
			16L-S1	1	FI	0 ppm		Dark brown sandy SILT, roots/vegetative material.	
			16L-S2	3		0 ppm		Red brown silty f-m SAND, and f-m gravel, glass frogs, moist.	
			16L-S3	5		0 ppm		Red brown silty f-m SAND, and f-m gravel, red sandstone rock frogs, wet.	
			16L-S4	3		0 ppm		Brown f-c SAND, little f gravel, trace silt, black organic staining present along horizontal seams, wet.	
			16L-S5	3		0 ppm		Red brown f-c SAND, and gravel, some silt, wet.	
			16L-S6	4	PT	0 ppm		Brown f-m SAND, some f gravel, little silt.	
			16L-S7	3		0 ppm		Black sandy SILT, with vegetative mat present, (meadow mat).	
			16L-S8	4	SW	0 ppm		Black sandy SILT, with vegetative mat present, (meadow mat).	
			16L-S9	2		0 ppm		Brown f-m SAND, some silt, some f-m gravel.	
			16L-S10	3		0 ppm		Brown f-m SAND, some silt, some f-m gravel.	
				4		0 ppm		Gray brown f-m SAND, little silt, trace f gravel.	
				7		0 ppm		Gray f-m SAND, little silt.	
				8	ML	0 ppm		Red brown clayey SILT, some f sand, varved.	







Site ID: SC-SB16	Location: Standard Chlorine Chemical Co.
Contractor: JCA Associates	Ground Surface Elevation (ft-msl): 5.01'
Consulting Firm: Key Environmental	Datum: Mean Sea Level
Logged By: TEJ	Date(s): 01/14/99 - 01/14/99

Type: Soil Boring

Drilling Method: Hollow Stem Auger

Well Construction Materials::

N/A

Riser Casing:  
N/A

Screens:  
N/A

SUPPLEMENTAL REMEDIAL INVESTIGATION  
STANDARD CHLORINE CHEMICAL CO.  
KEARNY, NEW JERSEY

Elevation (ft-msl)	Depth (ft-bgs)	Recovery	Sample No.	Blow Count	USCS Code	PID (ppm)	Graphic Log	Material Description	Borehole Construction
0			SB16-S1	5	FI	0 ppm		Auger 1' frozen gravel, brown gray f-m SAND, f gravel and green sand present.	
			SB16-S2	3				Brown gray f-m SAND, no green sand/gravel present, wet at 2'.	
			SB16-S3	12		0 ppm		Brown gray f-c SAND, some f-m gravel, wet.	
			SB16-S4	4		0 ppm		Red-brown f-c SAND, some f gravel, yellow staining on gravel.	
			SB16-S5	3	PT	0 ppm		Dark brown sandy SILT, with vegetative mat present.	
			SB16-S6	2		0 ppm		Dark brown sandy SILT, with vegetative mat present.	
			SB16-S7	3		0 ppm		Dark brown sandy SILT, with vegetative mat present.	
			SB16-S8	1	ML	0 ppm		Gray green sandy SILT, some f sand, little clay.	
			SB16-S9	2	SM	0 ppm		Gray brown f-m SAND, some silt, grades to f-c SAND at base.	
			SB16-S10	7		0 ppm		Gray brown f-c SAND, some f gravel.	
			SB16-S11	13		0 ppm		Gray brown f-c SAND, some f gravel.	
			SB16-S12	14		0 ppm		Brown to red varved clayey SILT, some f sand.	
			SB16-S13	9	CL	0 ppm			
			SB16-S14	10					
			SB16-S15	12					
			SB16-S16	11					

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